

Figure 1

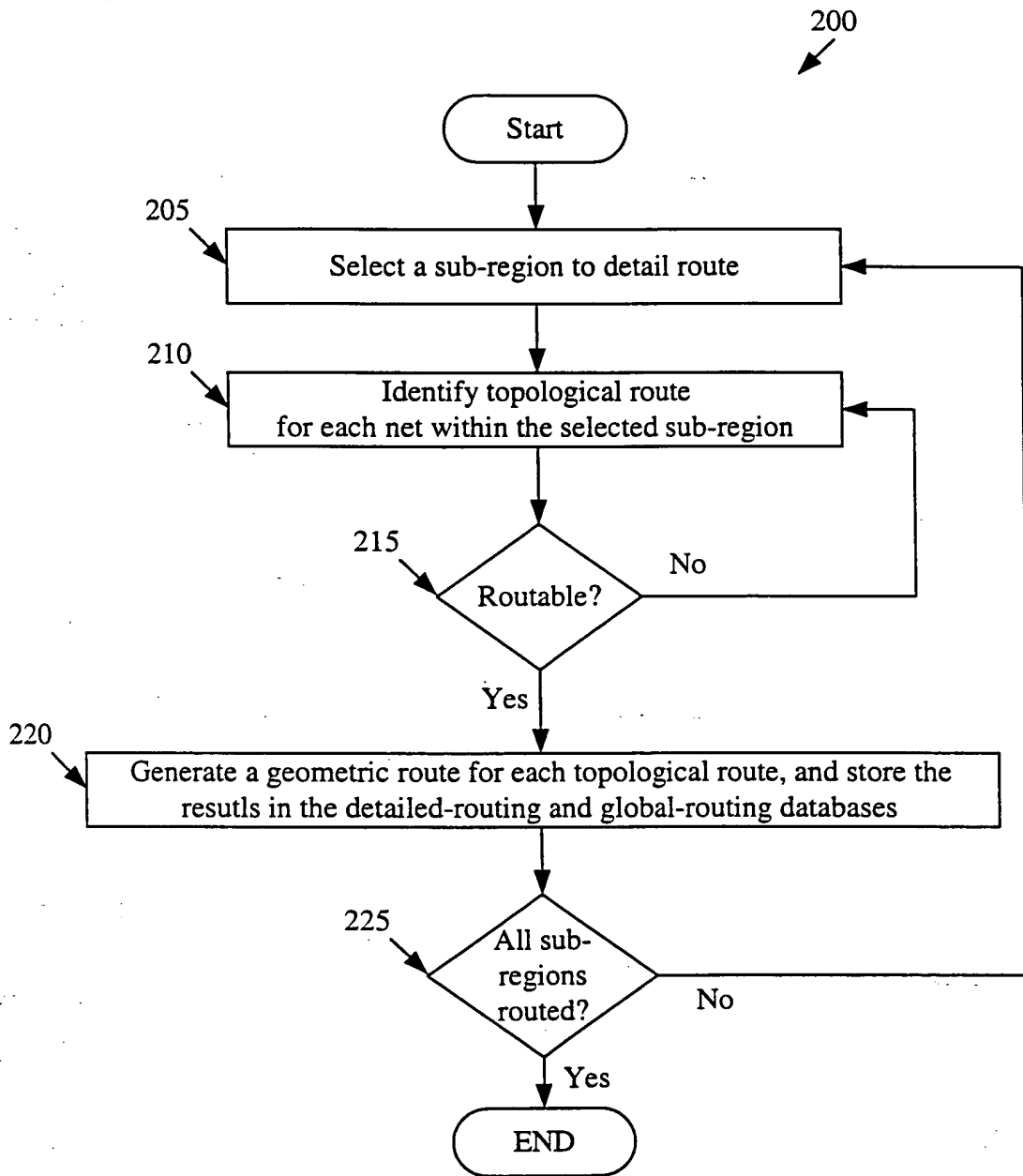


Figure 2

DATE FOR + 603300T

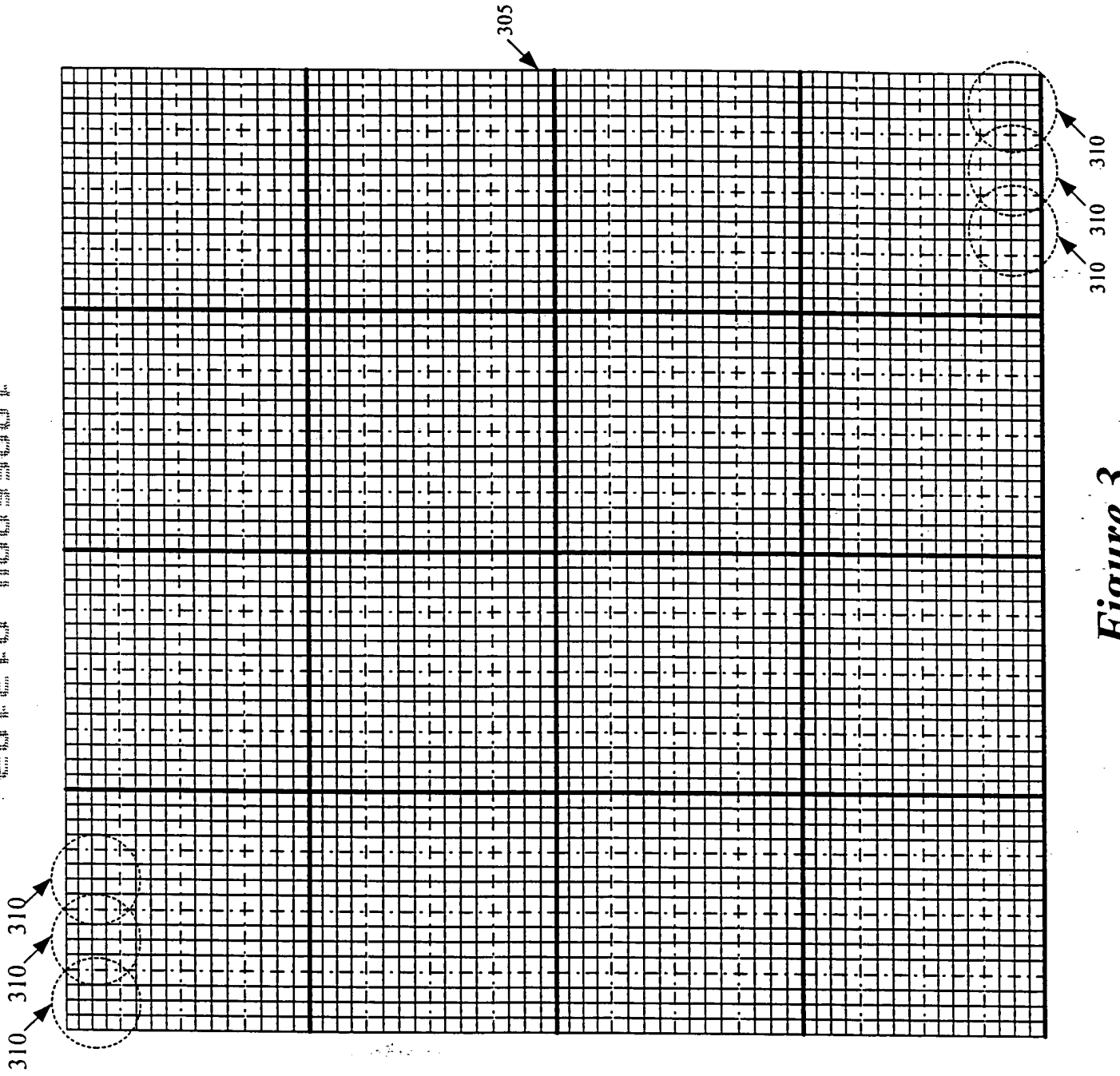


Figure 3

202501-46099001

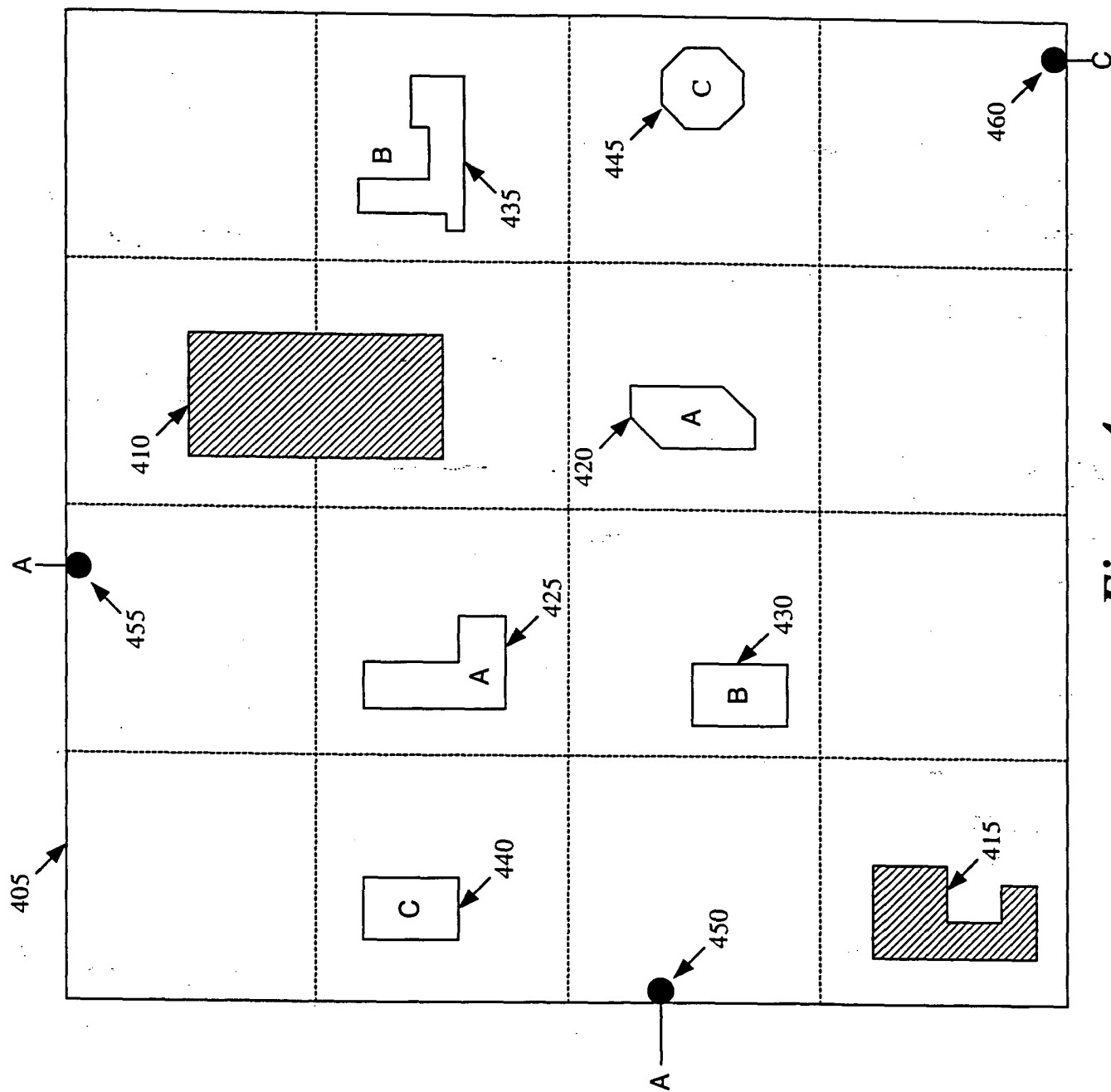


Figure 4

201604090001

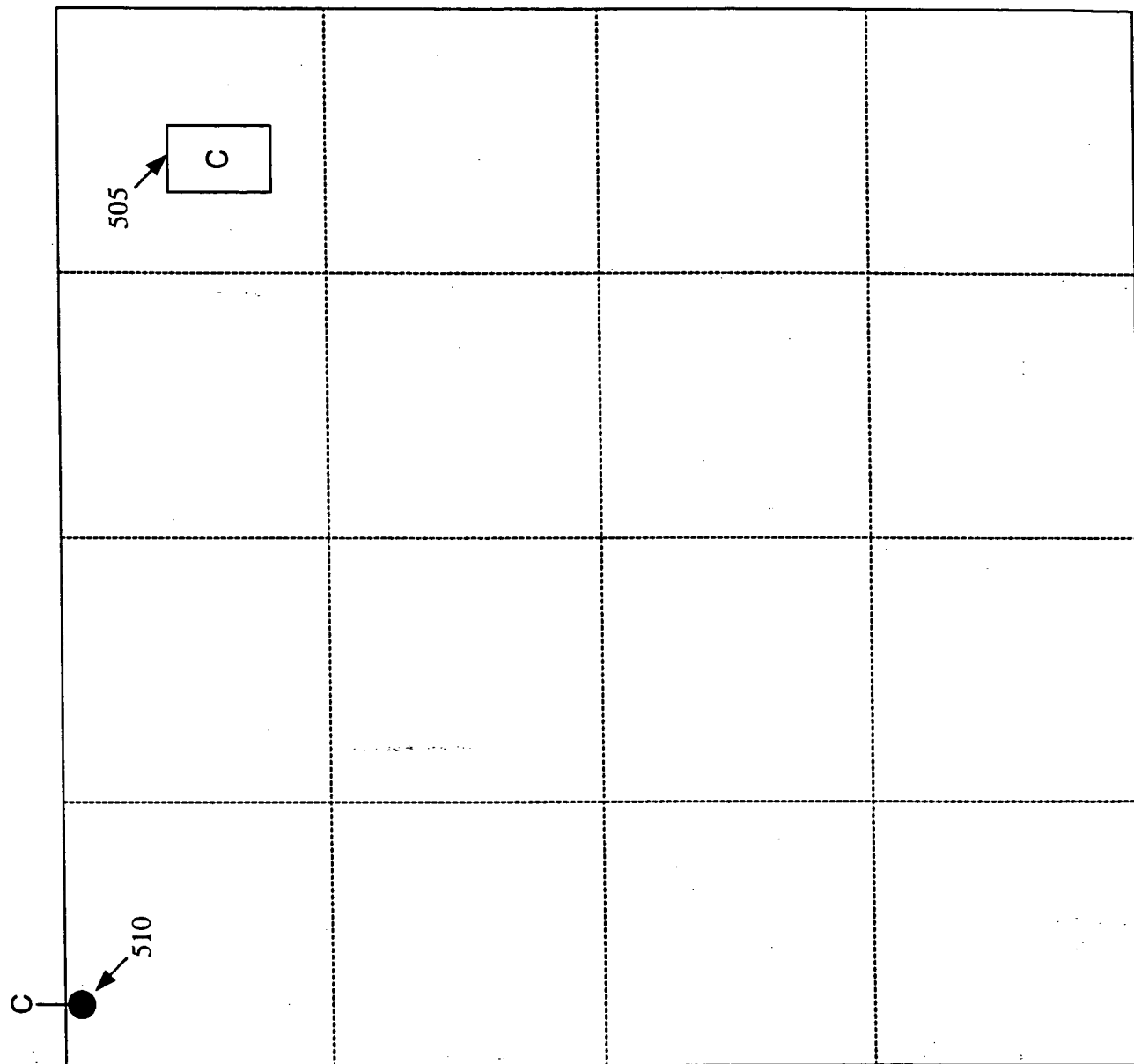


Figure 5

- List of Geometries
 - Each Geometry including a sequence of points & layer assignment
- Bounding box of the region
- Array of layer properties
 - Minimum wire size
 - Minimum spacing
 - Via sizes
 - Cost/Unit
- Netlist specifying a number of nets
 - Each net specifying a set of pins
 - Each pin specifying a set of ports
 - Each port specifying a set of geometries

Figure 6

- List of Geometries
 - Each Geometry including a sequence of points & layer assignment
 - List of connection nodes inside each pin geometry
- Bounding box of the region
- Array of layer properties
 - Minimum wire size
 - Minimum spacing
 - Via sizes
 - Cost/Unit
- Netlist specifying a number of nets
 - Each net specifying a set of pins
 - Each pin specifying a set of ports
 - Each port specifying a set of geometries
- For each layer, a graph specifying
 - Nodes
 - Edges
 - Faces

Figure 7

Face
<ul style="list-style-type: none"> -Reference to 3 edges -Reference to 3 nodes -Up to two references for up to two face item

800

Edge
<ul style="list-style-type: none"> -Two references for up to two faces of the edge -Capacity -Flow -Constrained -Linked list of items on the edge starting with one of the edge's nodes and ending with its other node

900

Figure 8

Figure 9

Node
<ul style="list-style-type: none"> -Net Identifier -One or more planar-path references to adjacent topological items in the same planar path -A pair of via-path references to up and down topological via items -A references to list of edges connected to the node -For each edge, an edge reference to the next or previous topological item on the edge -A reference to the geometry of the node -Vertex number identifying the vertex of the geometry -Location of the node

1000

Figure 10

Edge Item
<ul style="list-style-type: none"> -Reference to its edge -Net Identifier -A pair of planar-path references to adjacent topological items in the same planar path -A pair of edge references to the next and previous topological item on the edge

1100

Face Item
<ul style="list-style-type: none"> -Reference to its face -Net Identifier -Up to 3 planar-path references for adjacent topological items in the same planar path -A pair of via-path references for up and down topological via items -Bounding polygon that defines legal face item locations -Constraining Points and Distances

1200

Figure 11

Figure 12

100968

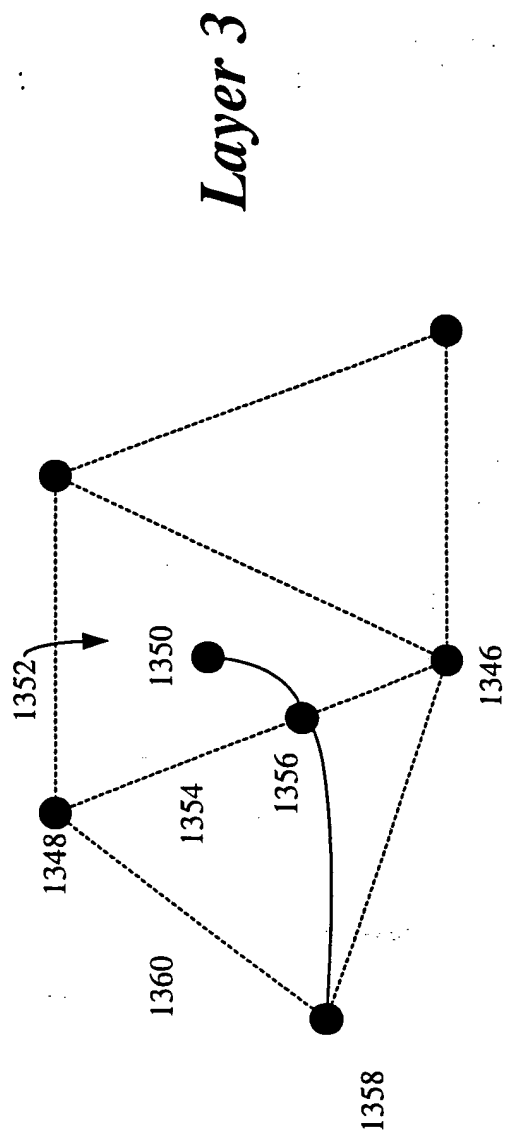
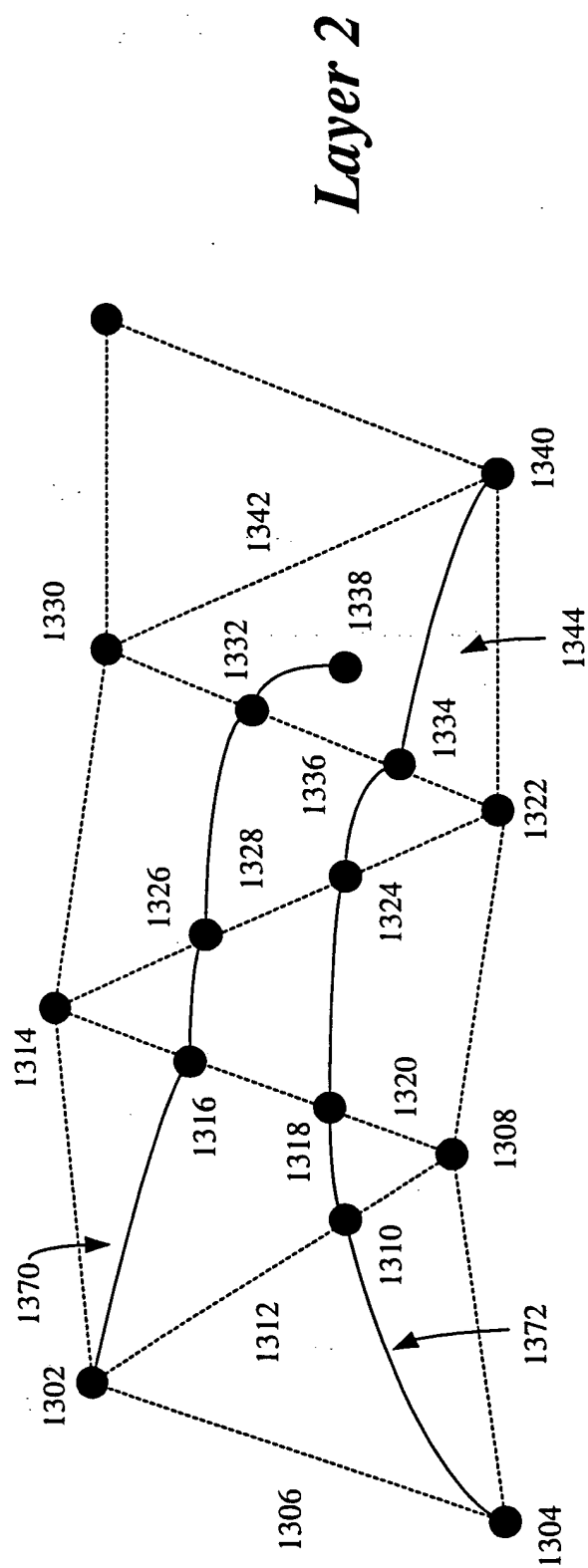


Figure 13

FIG. 14

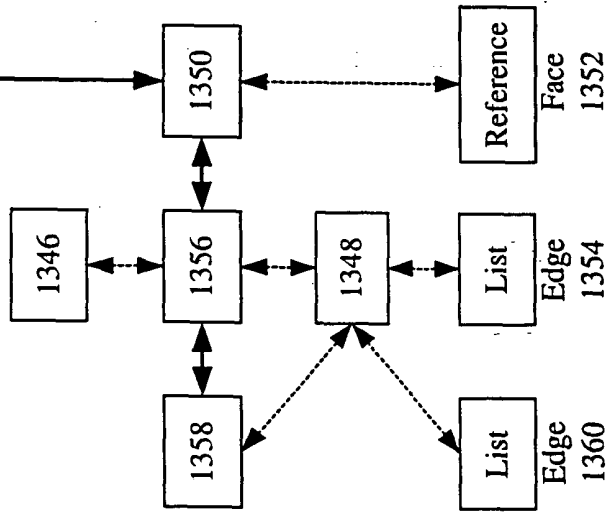
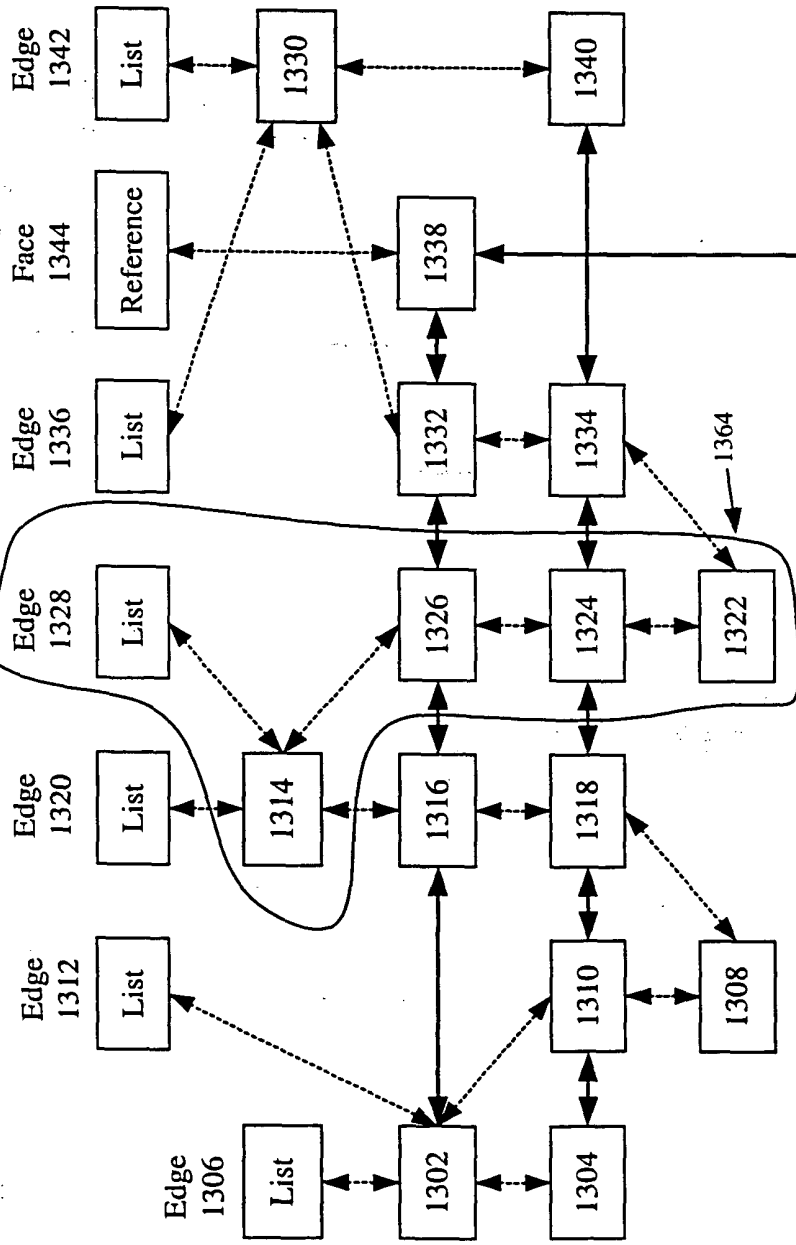


Figure 14

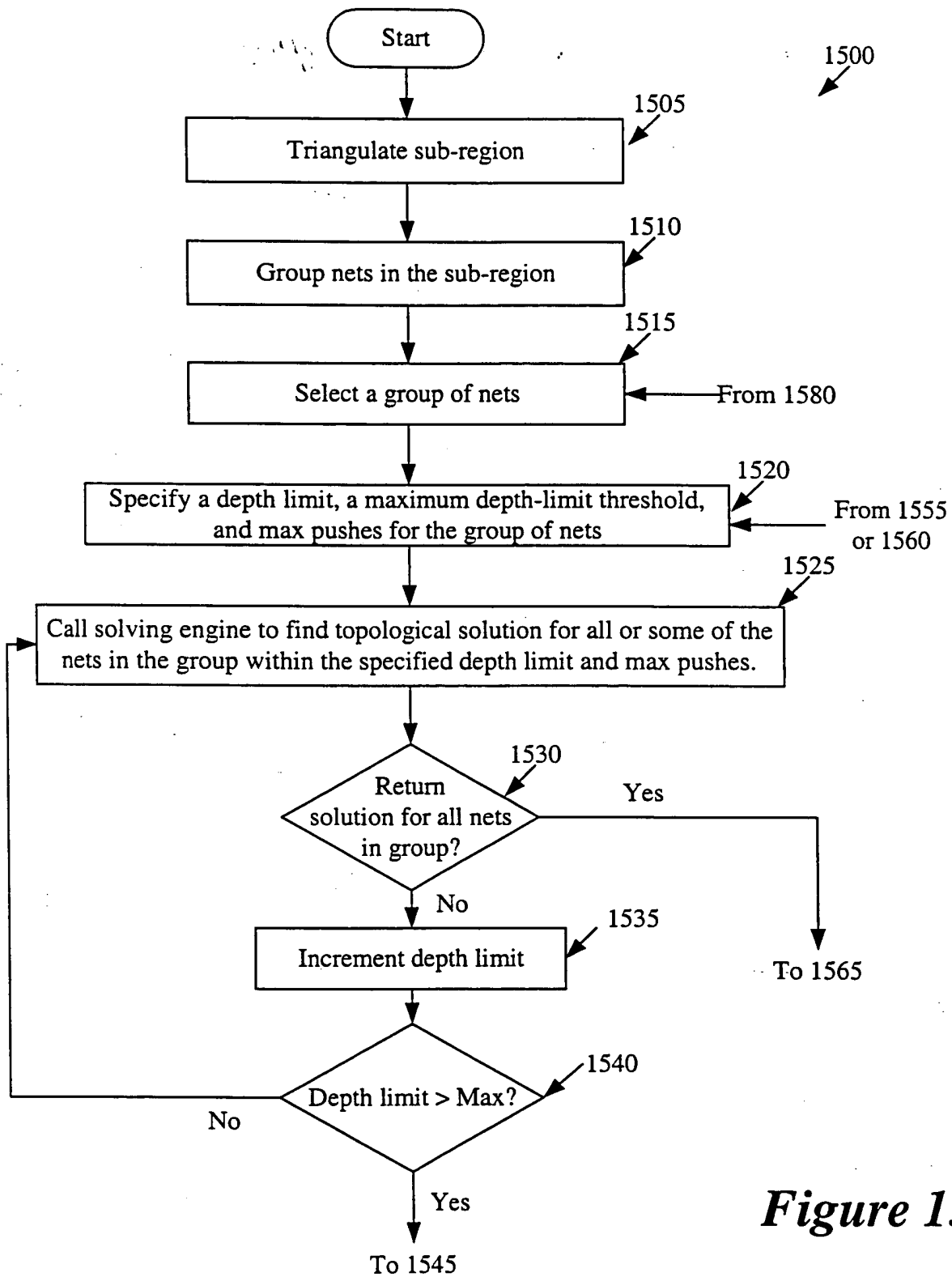


Figure 15A

Figure 15: *Figure 15A*
Figure 15B

202510450900T

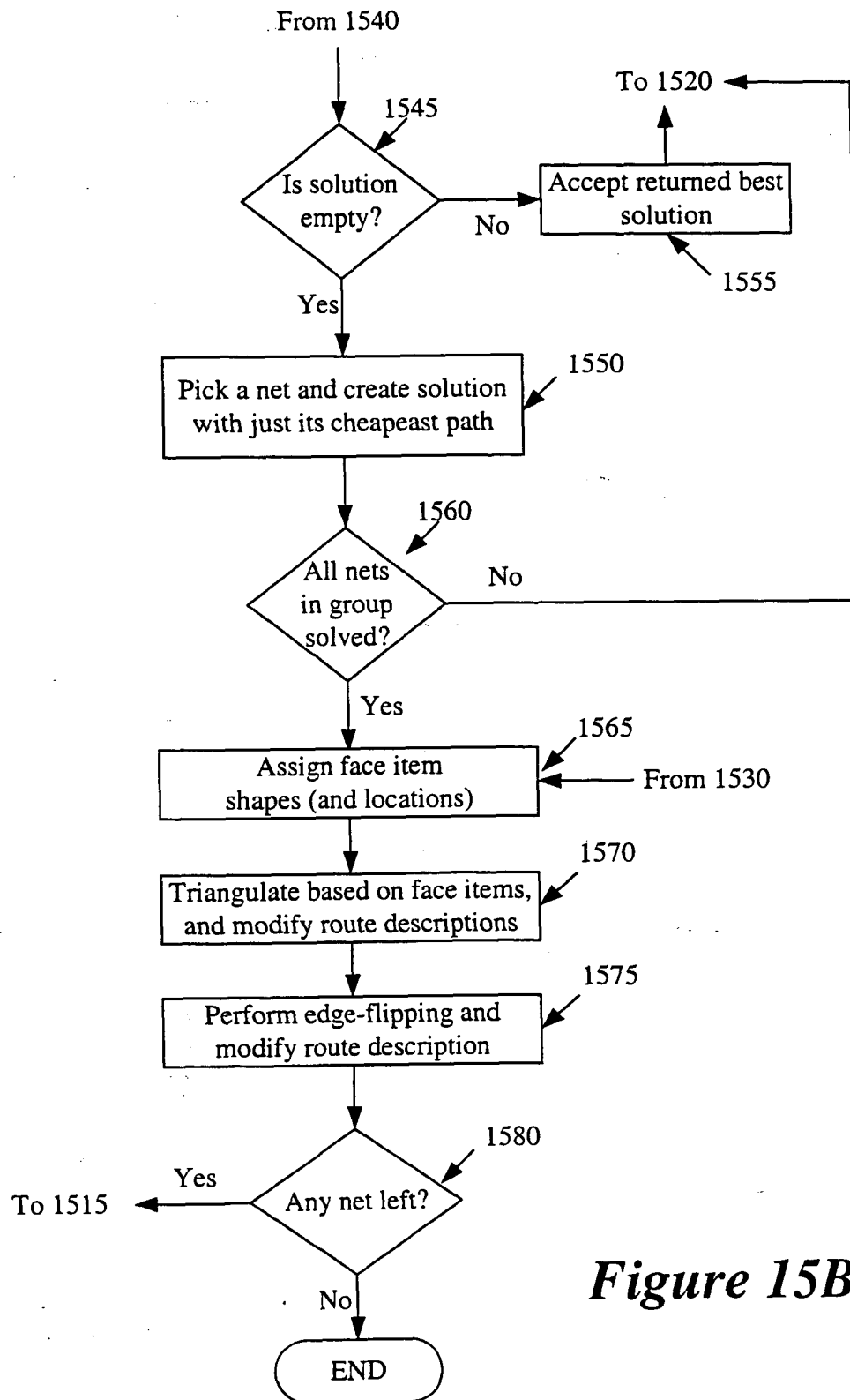


Figure 15B

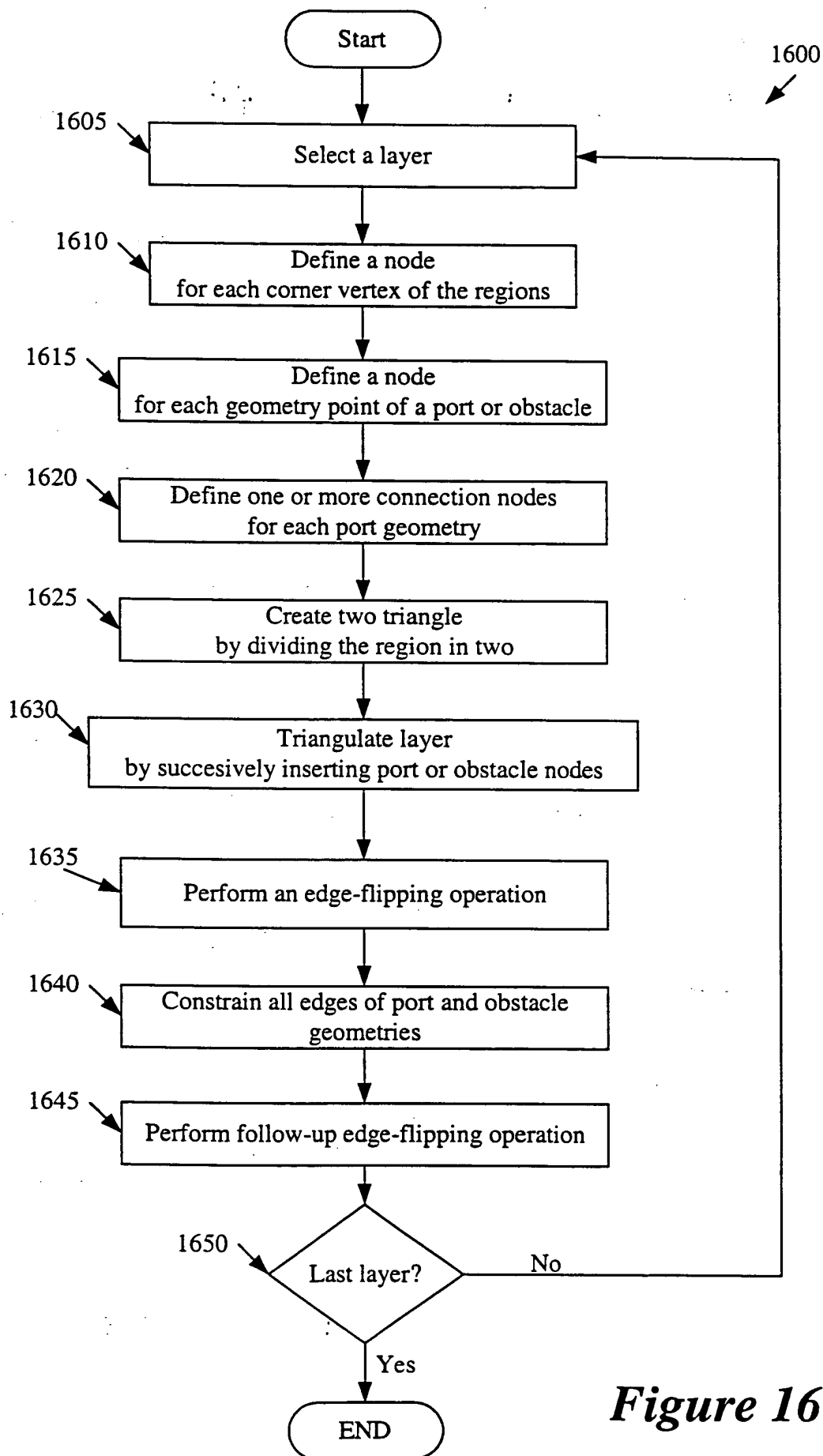


Figure 16

201E10-A4609900T

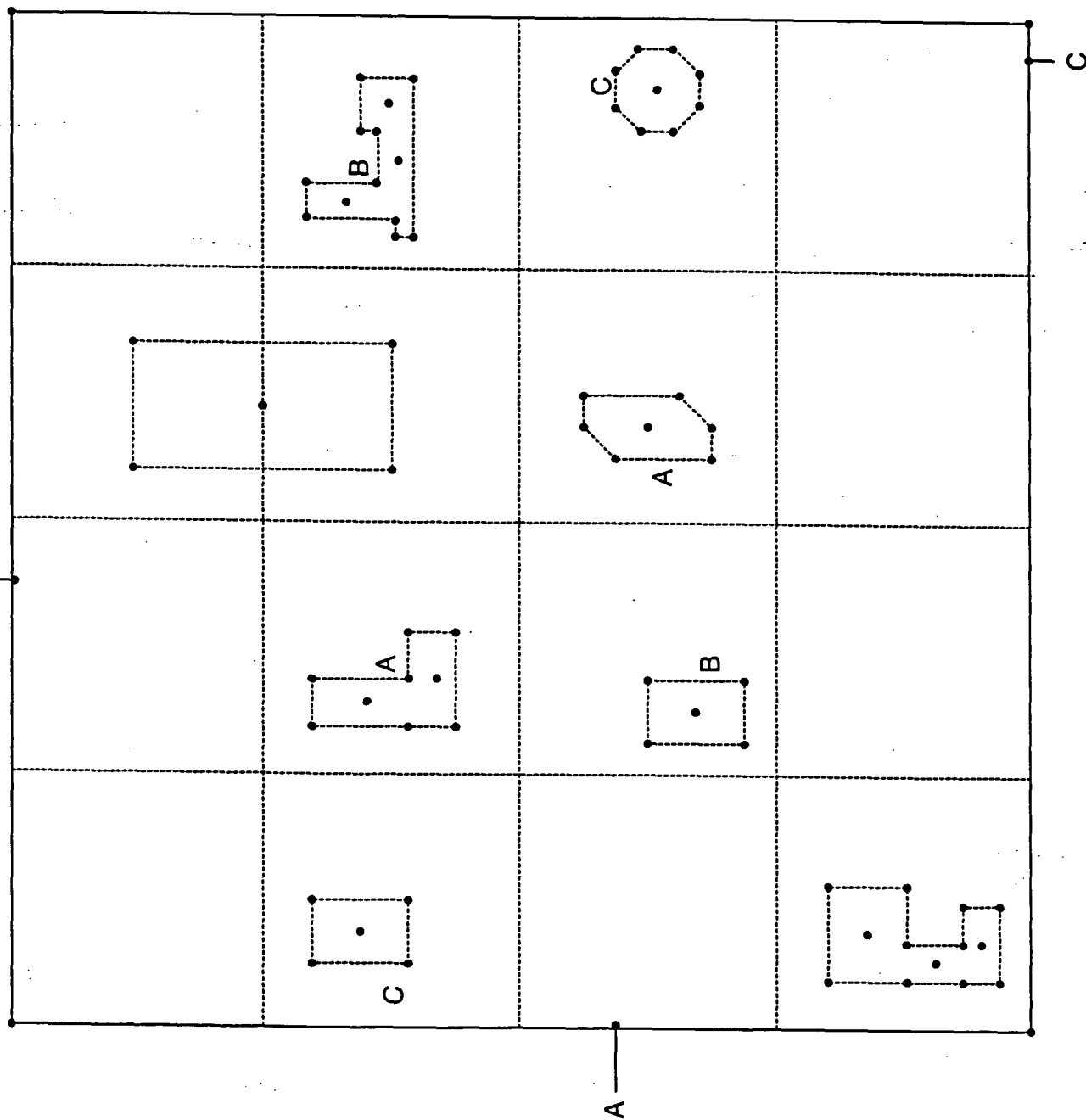


Figure 17

Figure 19

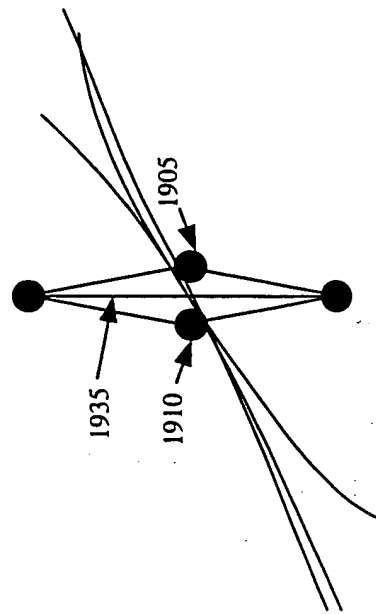


Figure 20

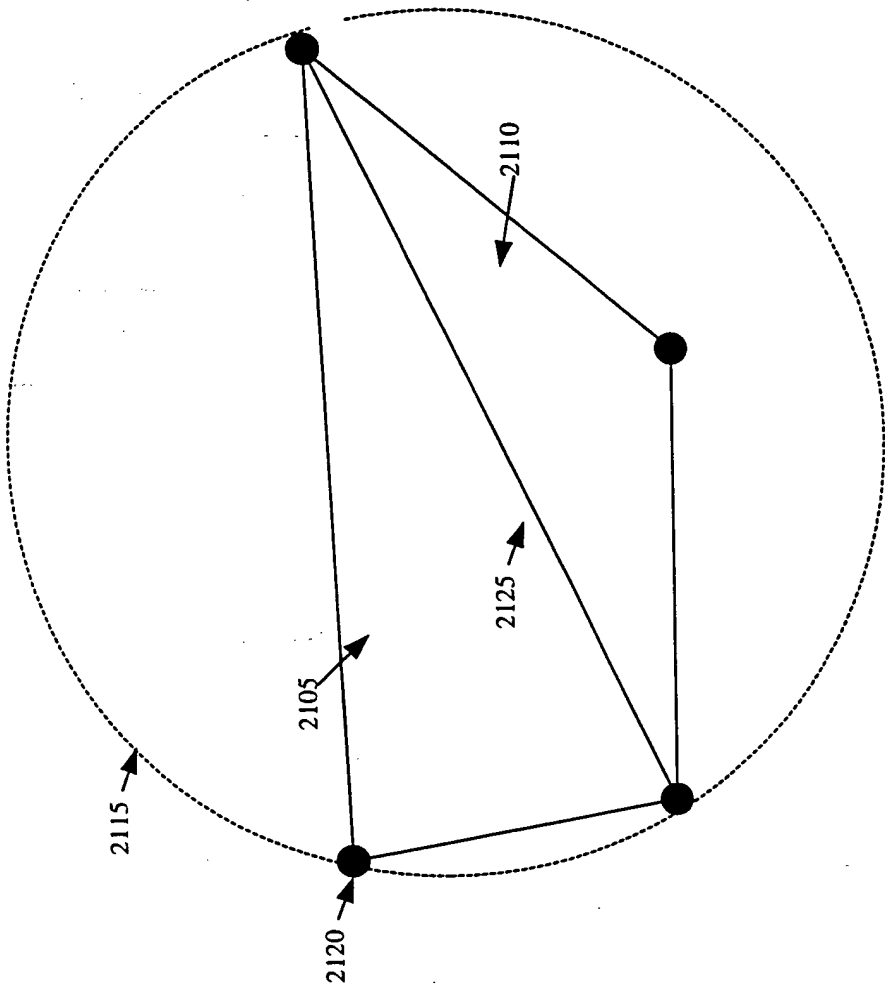


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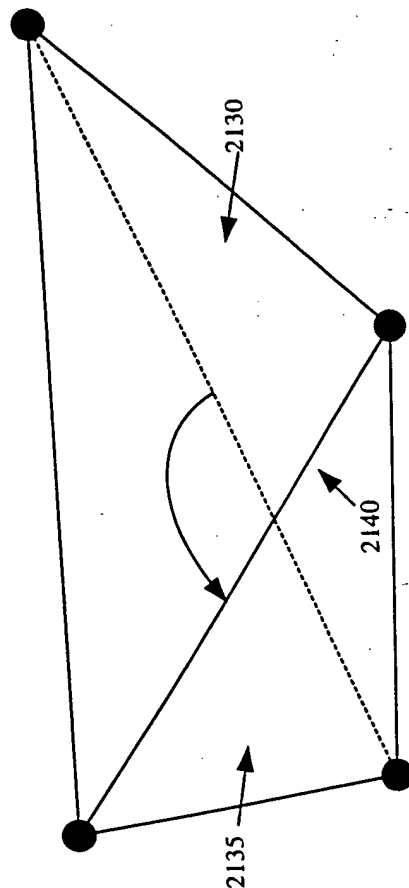


Figure 22

REF ID: A69900T

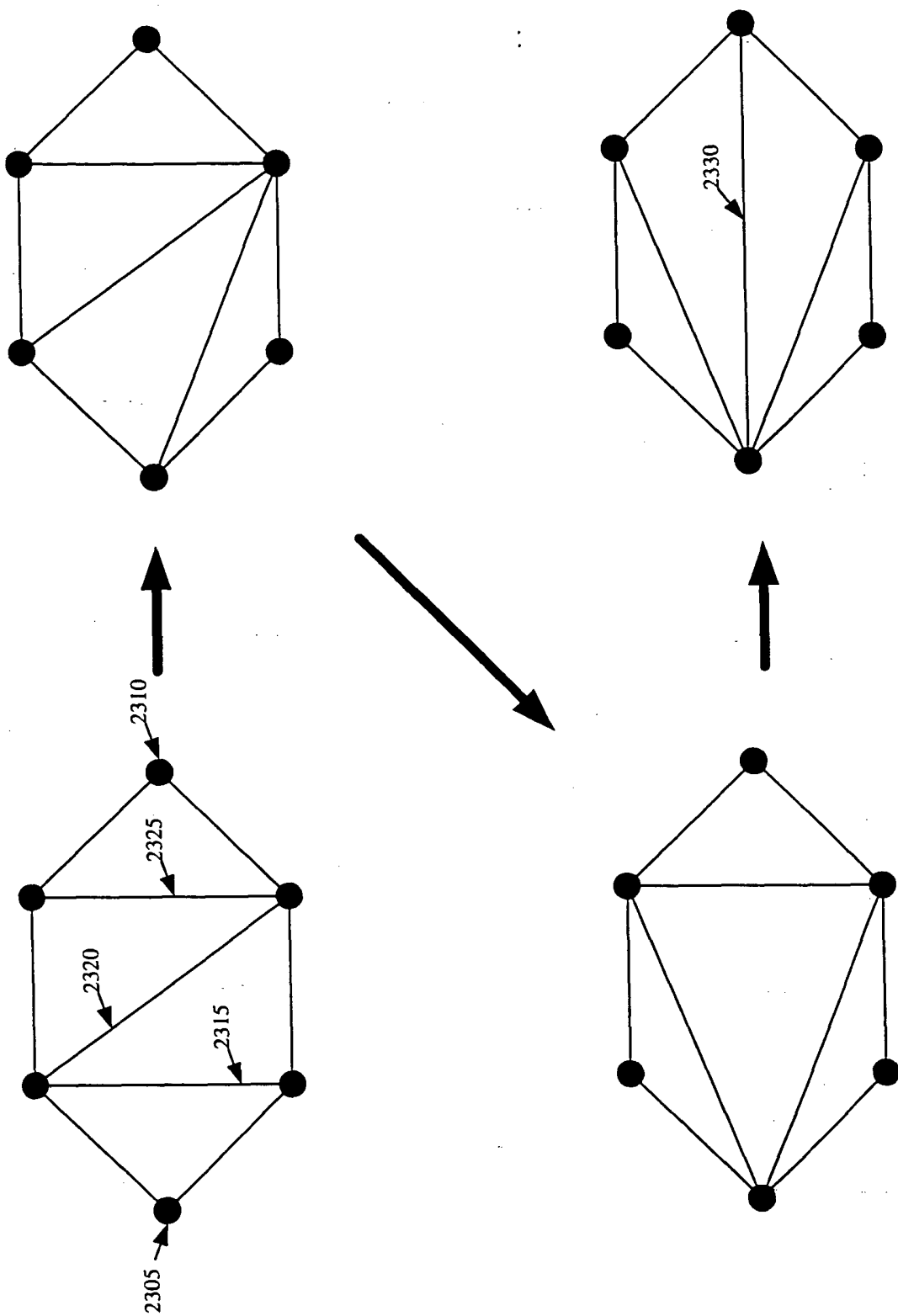


Figure 23

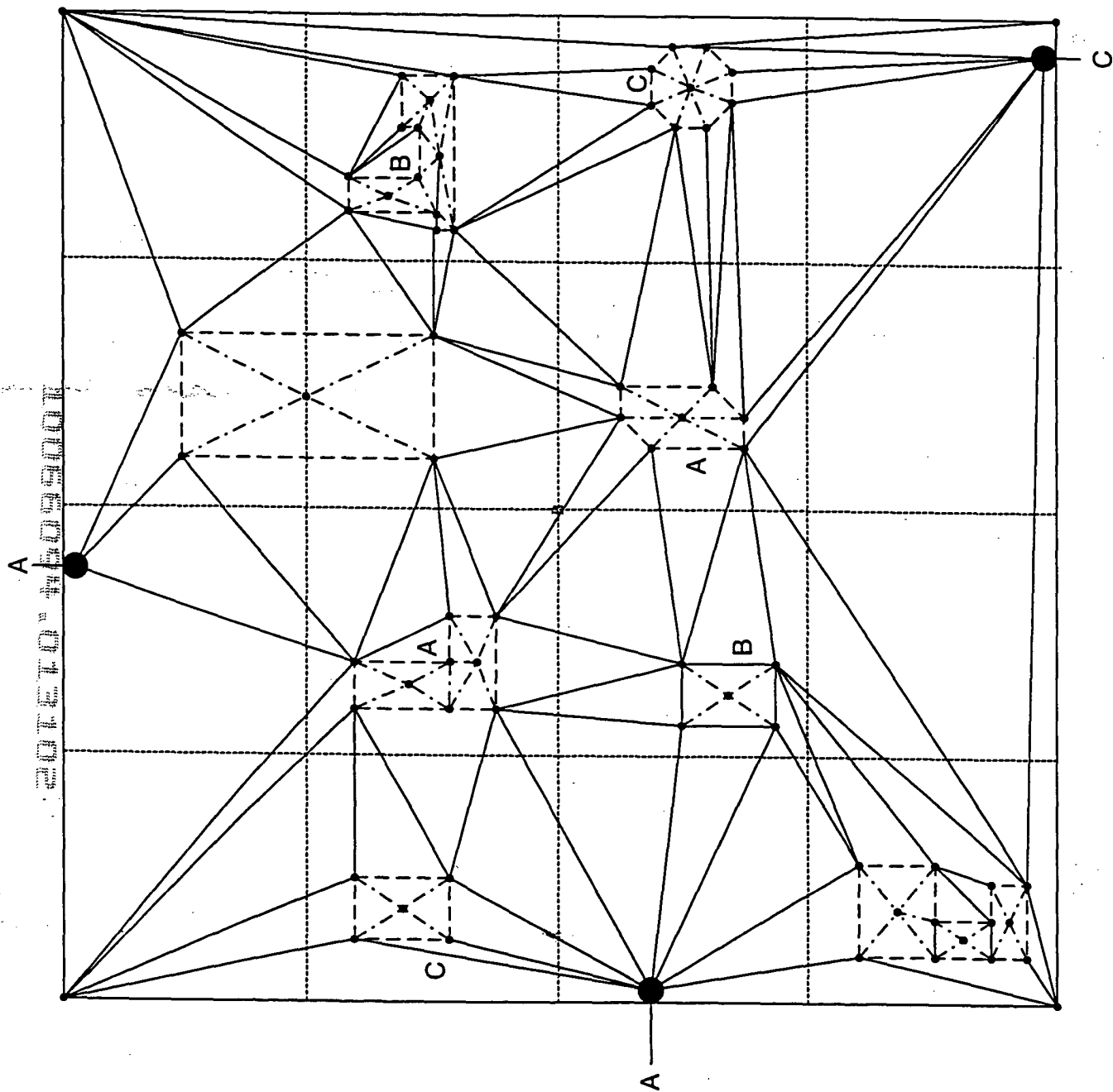


Figure 24

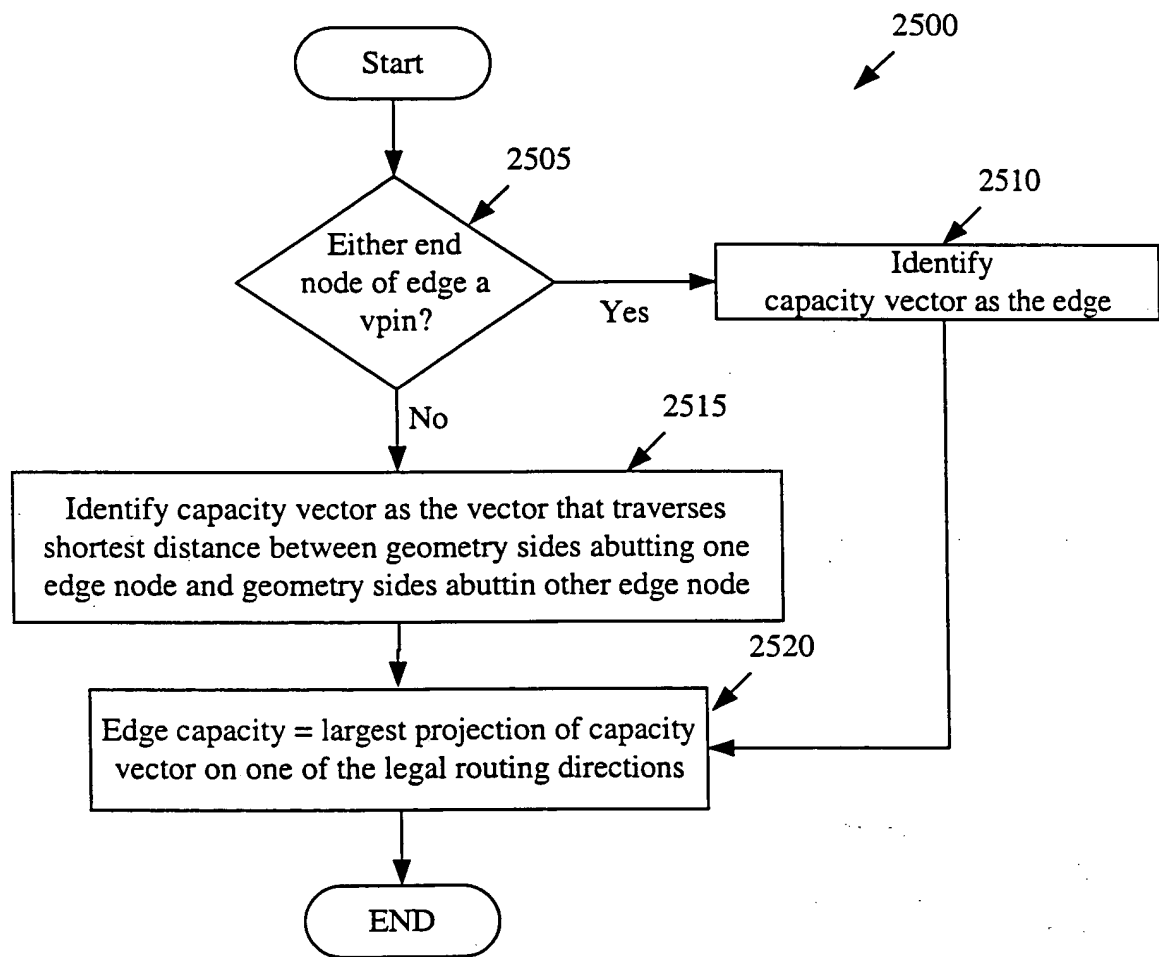


Figure 25

2025 RELEASE UNDER E.O. 14176

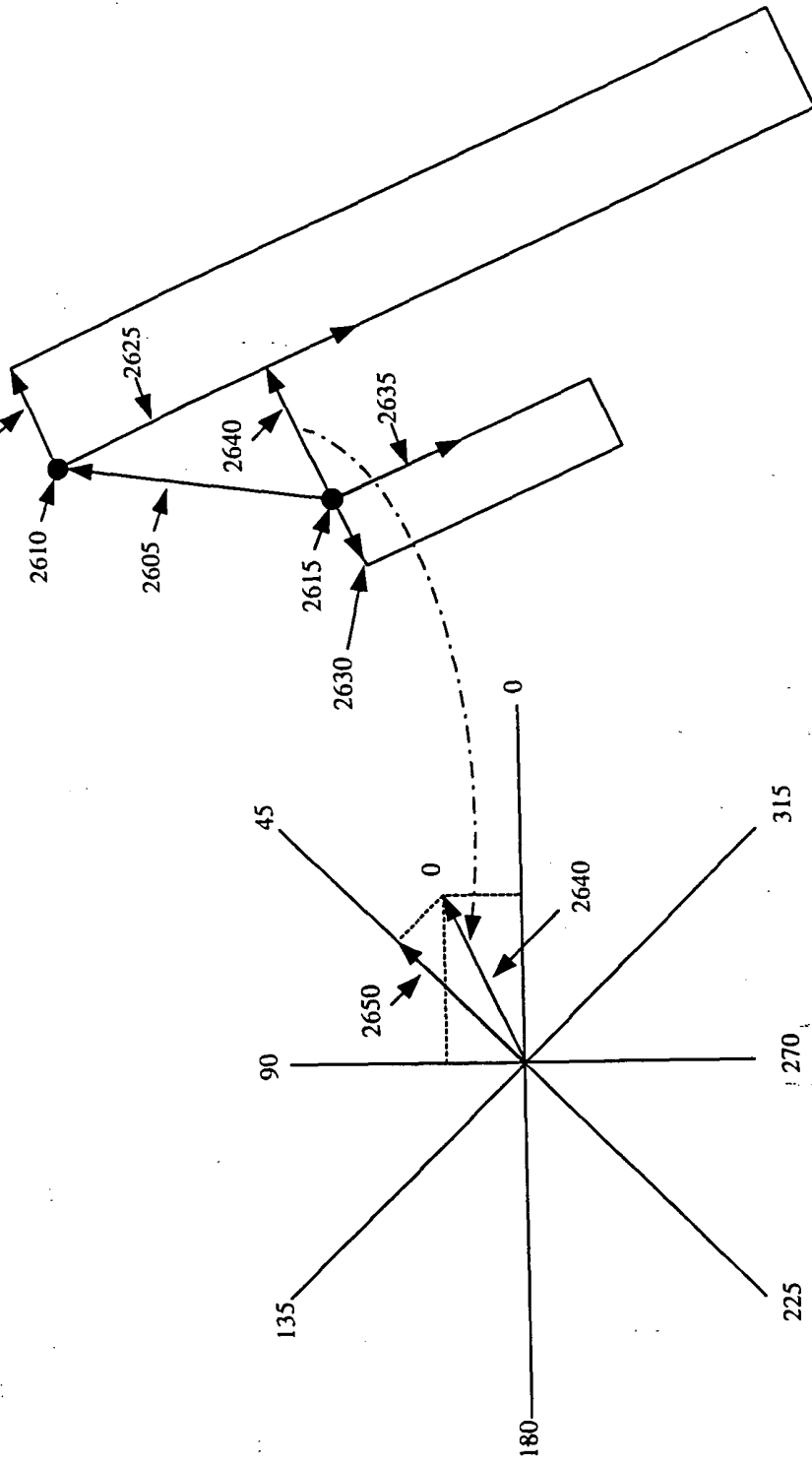


Figure 26

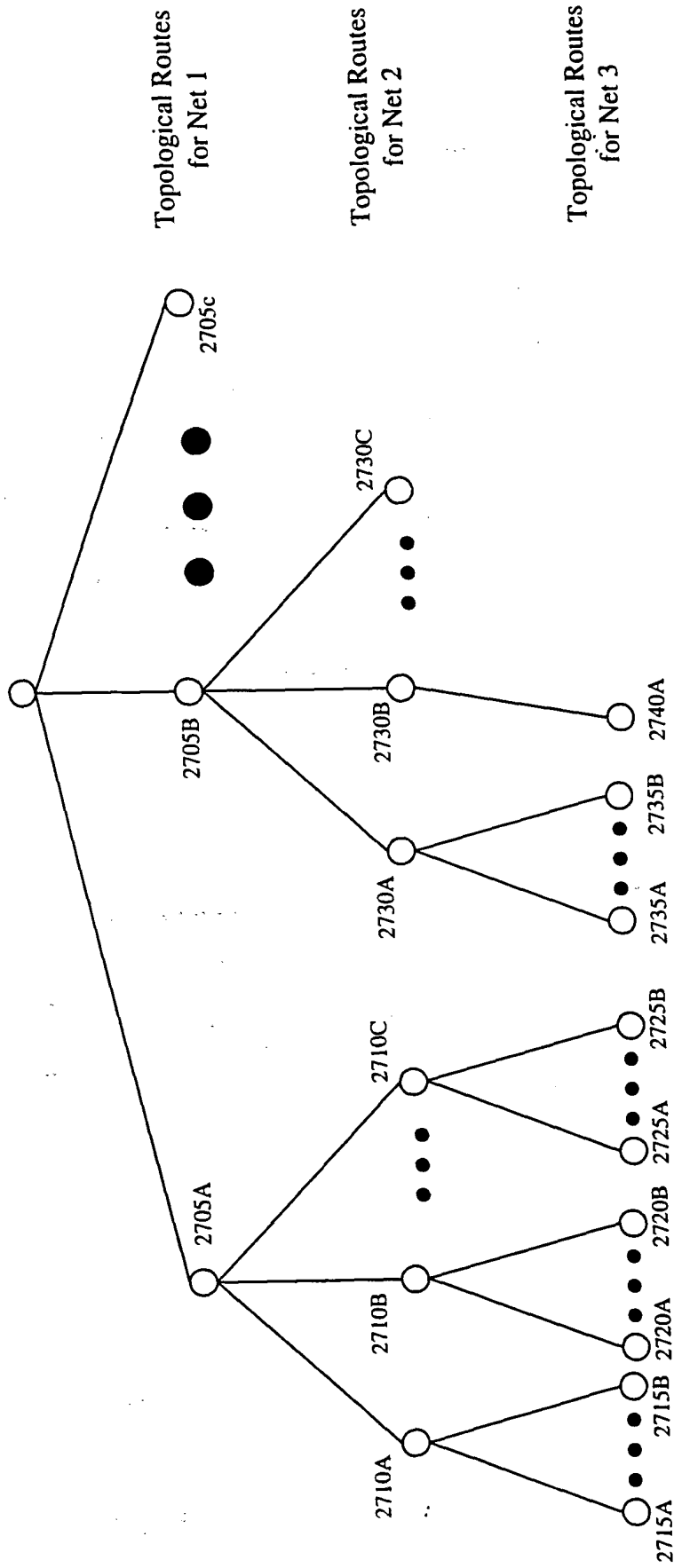


Figure 27

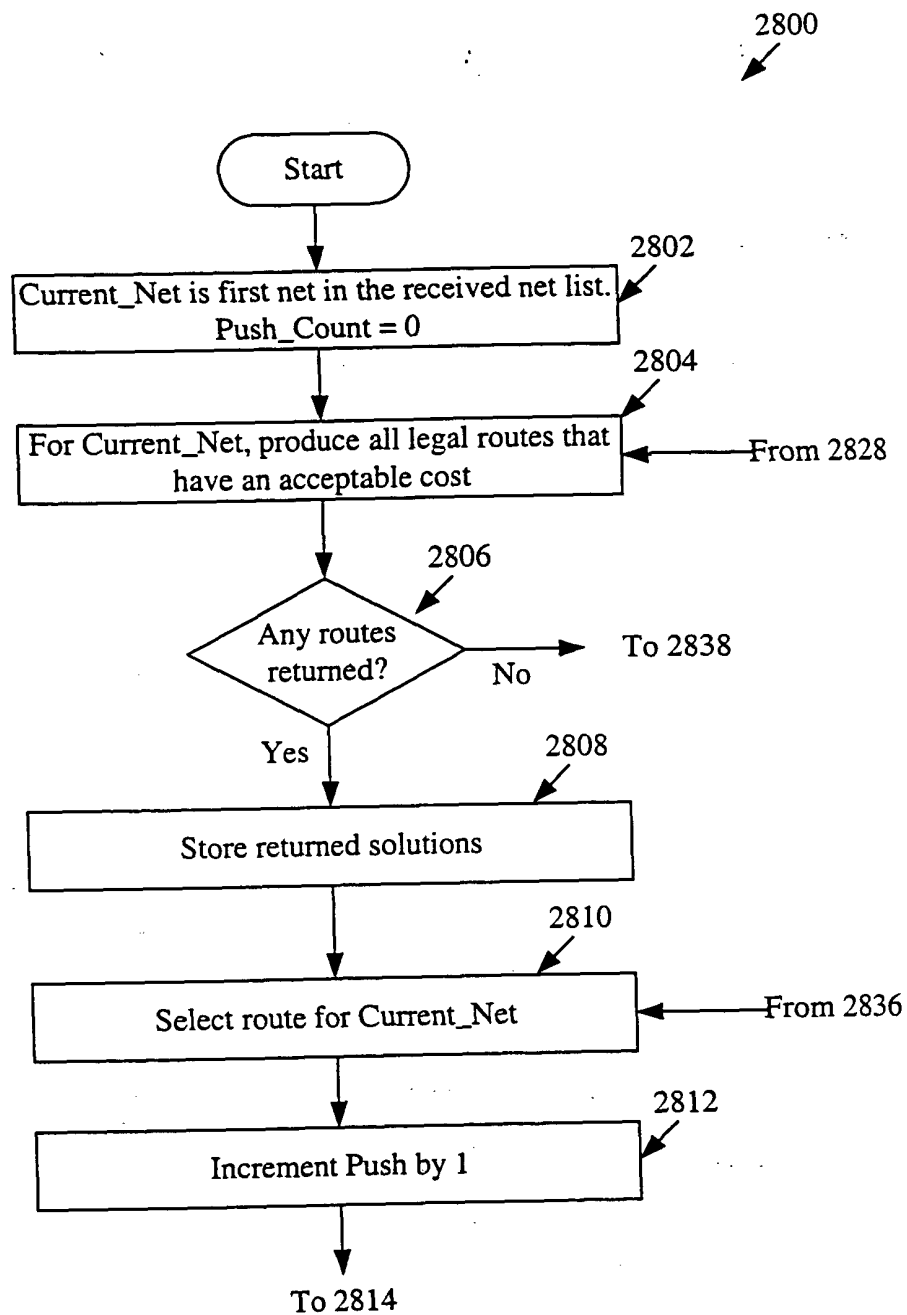


Figure 28A

Figure 28: $\frac{\text{Figure 28A}}{\text{Figure 28B} + \text{Figure 28C}}$

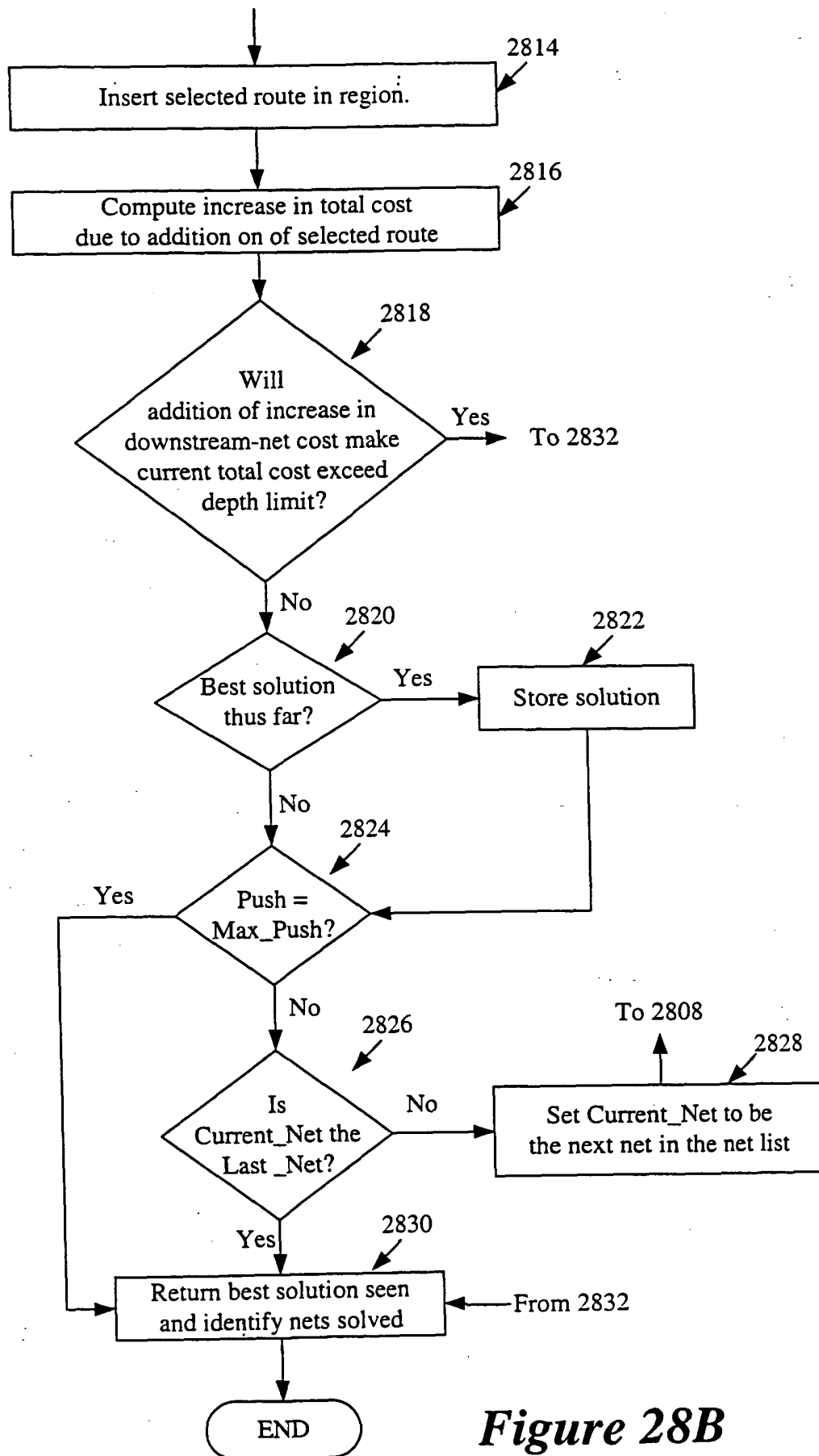


Figure 28B

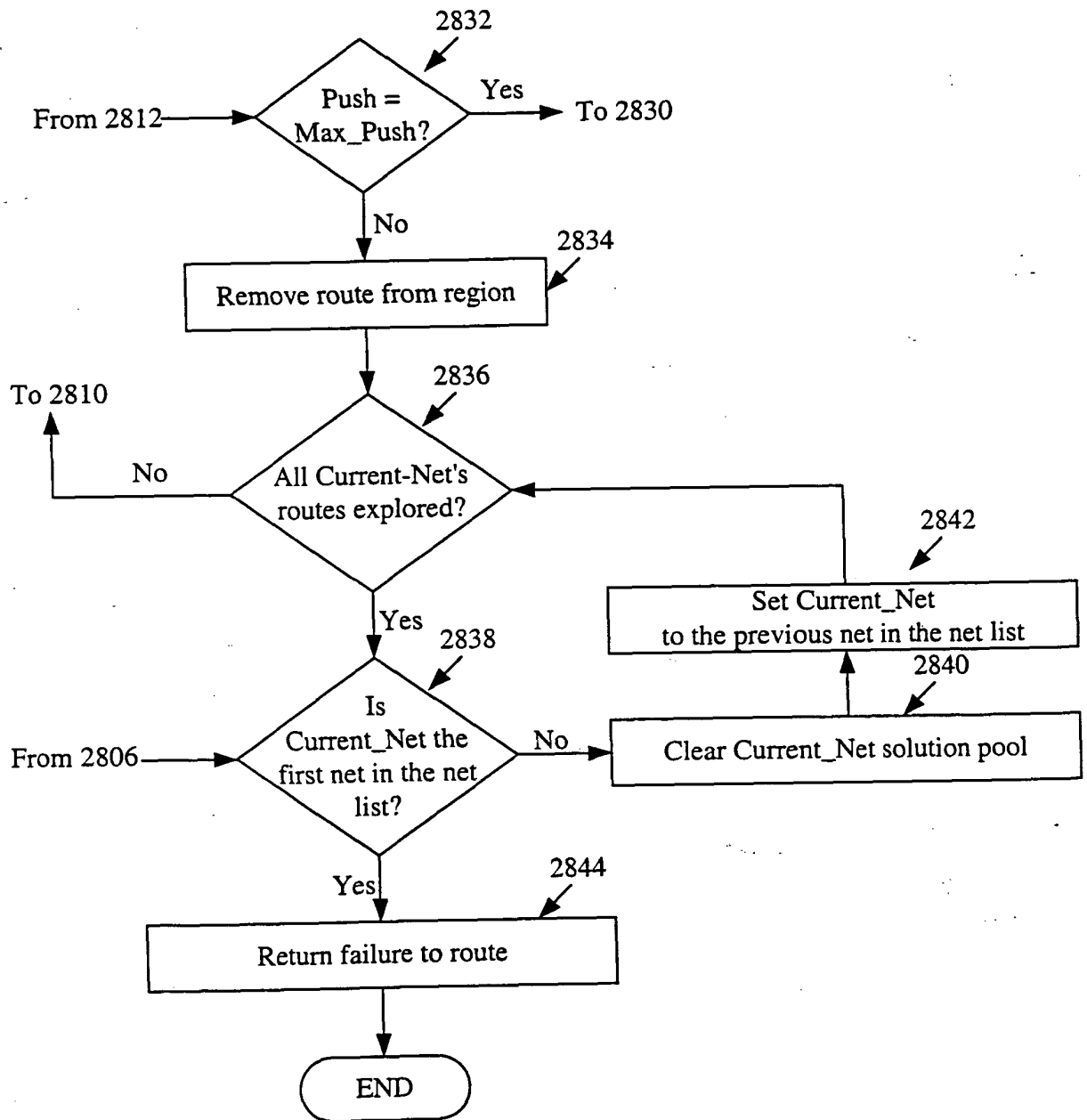


Figure 28C

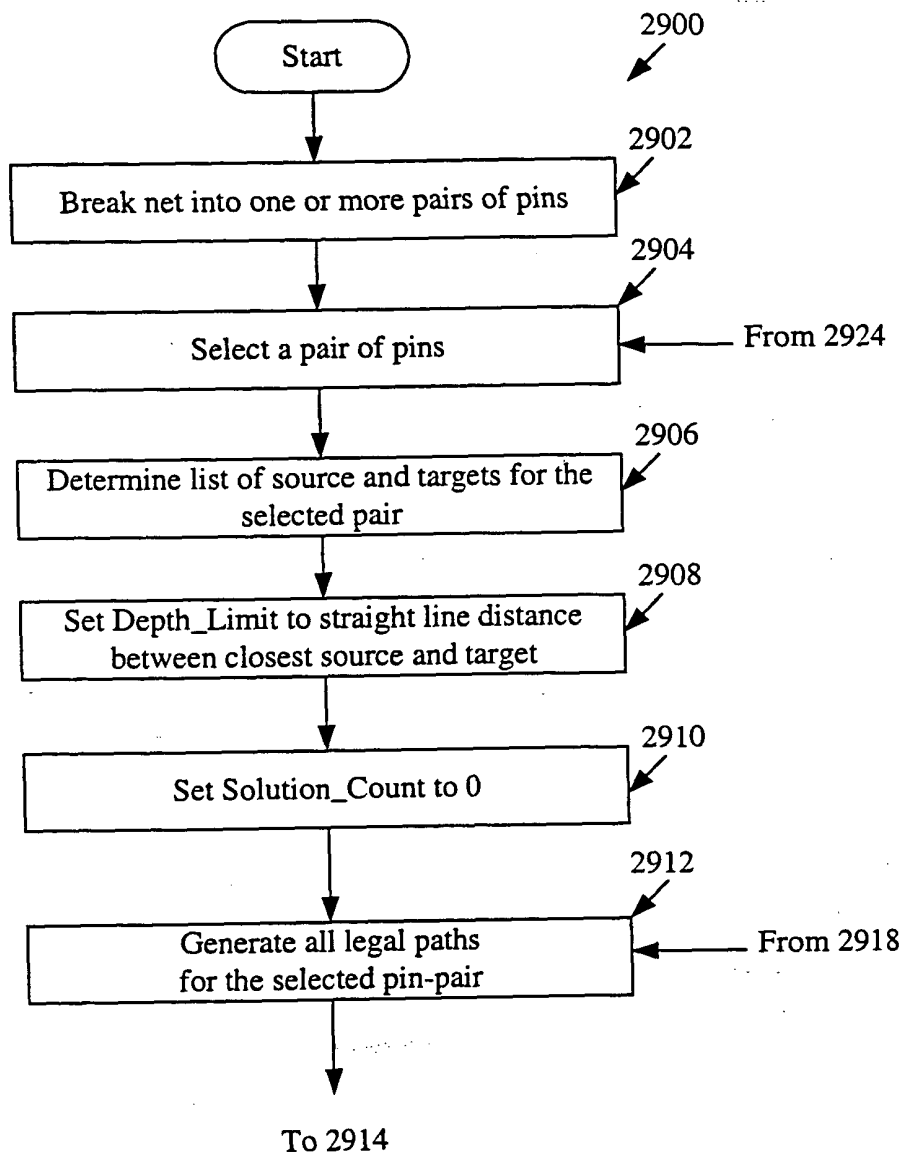


Figure 29A

Figure 29: $\frac{\text{Figure 29A}}{\text{Figure 29B}}$

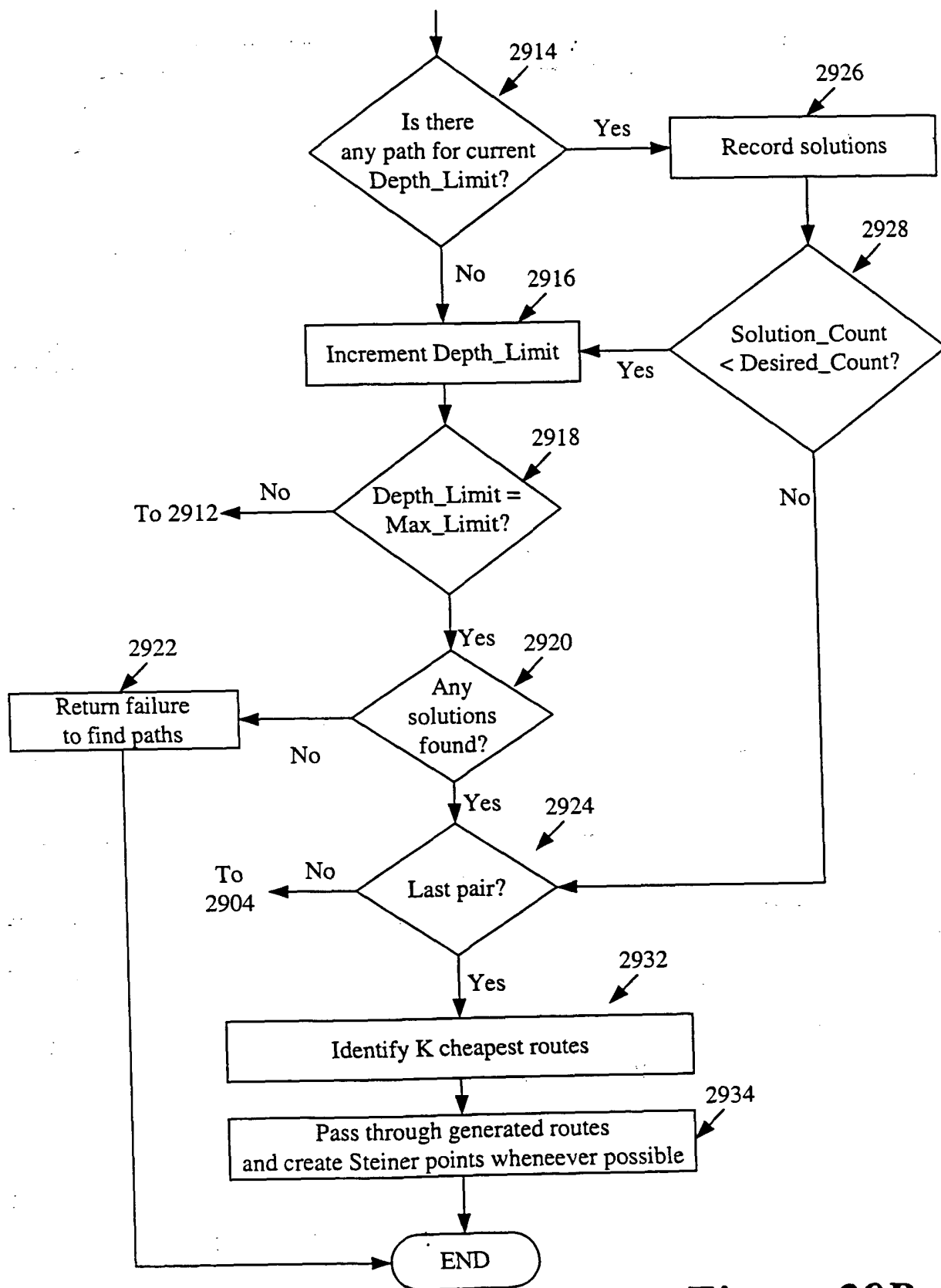


Figure 29B

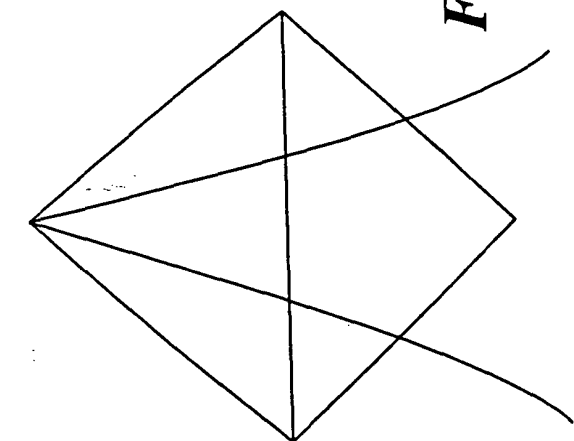


Figure 30A

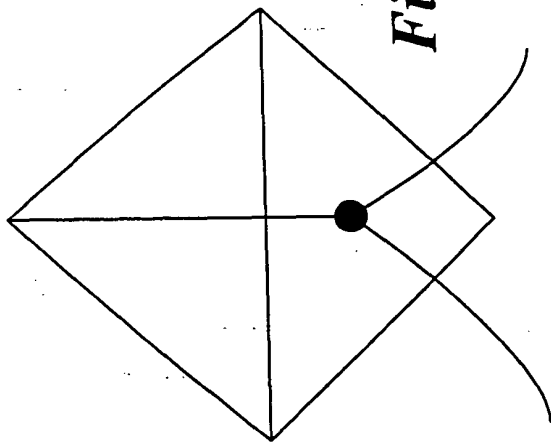


Figure 30B

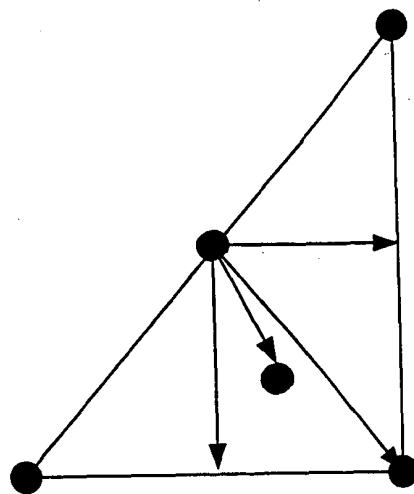


Figure 32

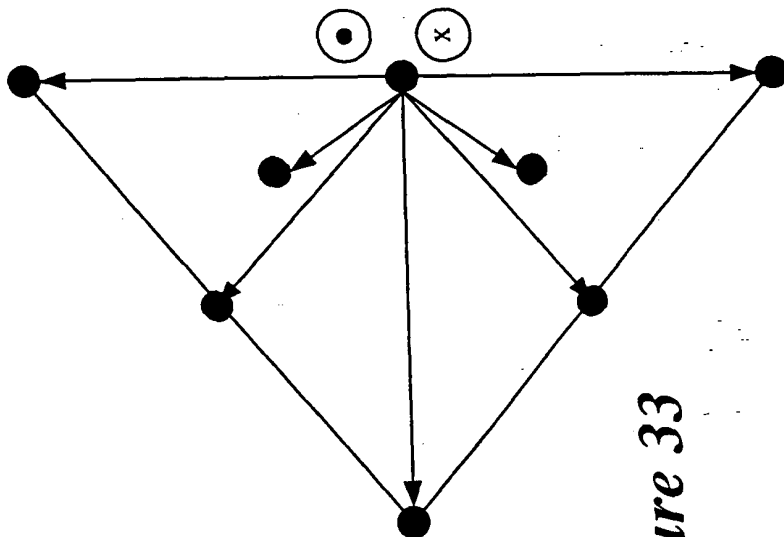


Figure 33

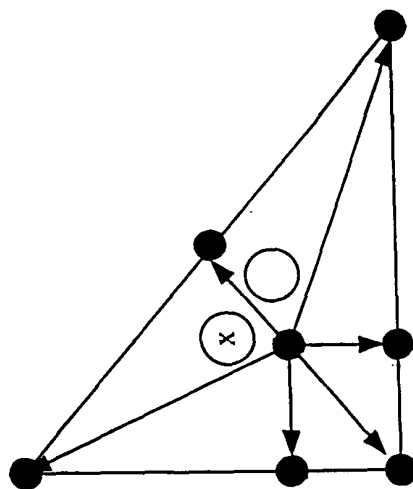


Figure 34

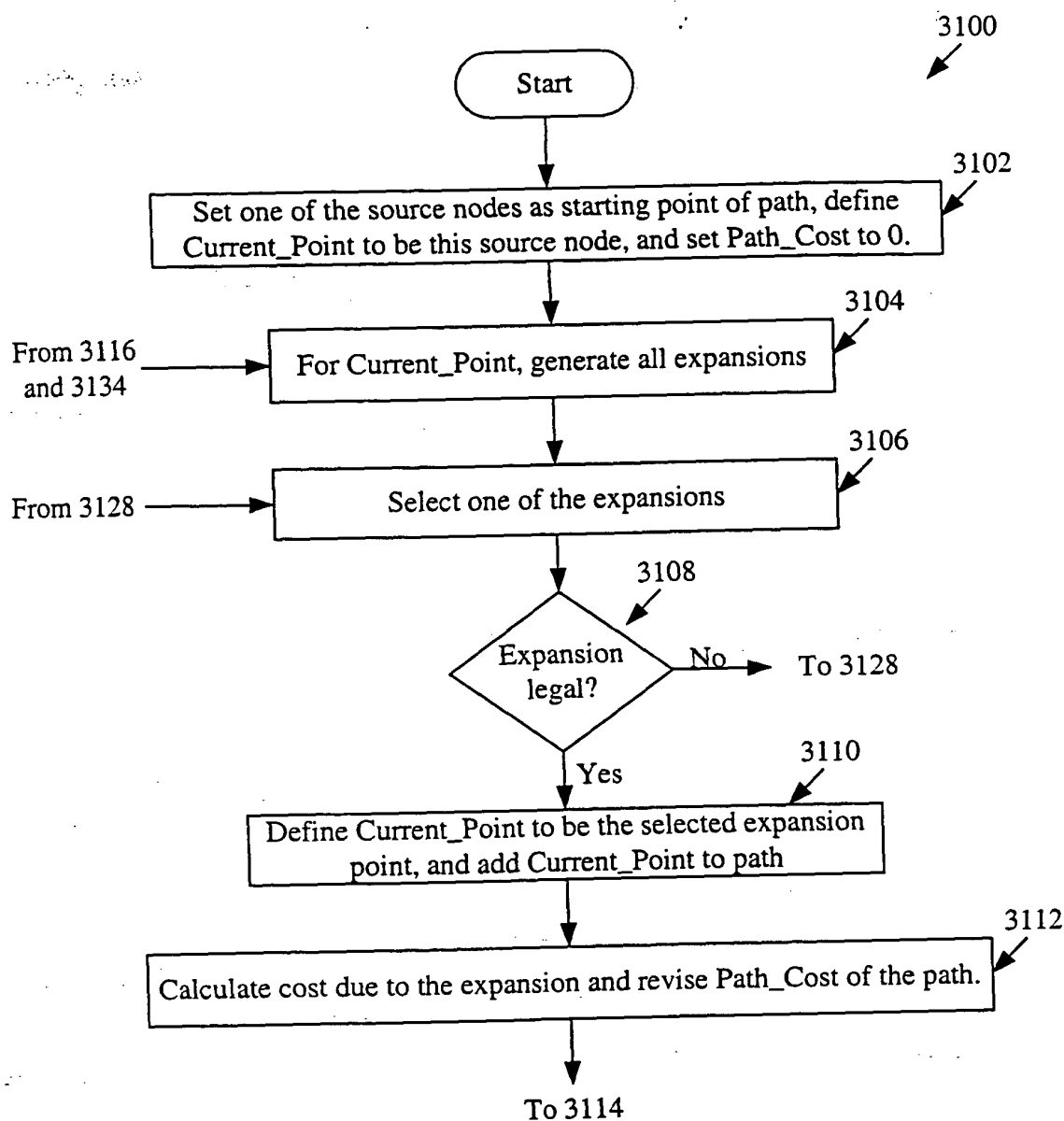


Figure 31A

Figure 31: $\frac{\text{Figure 31A}}{\text{Figure 31B}}$

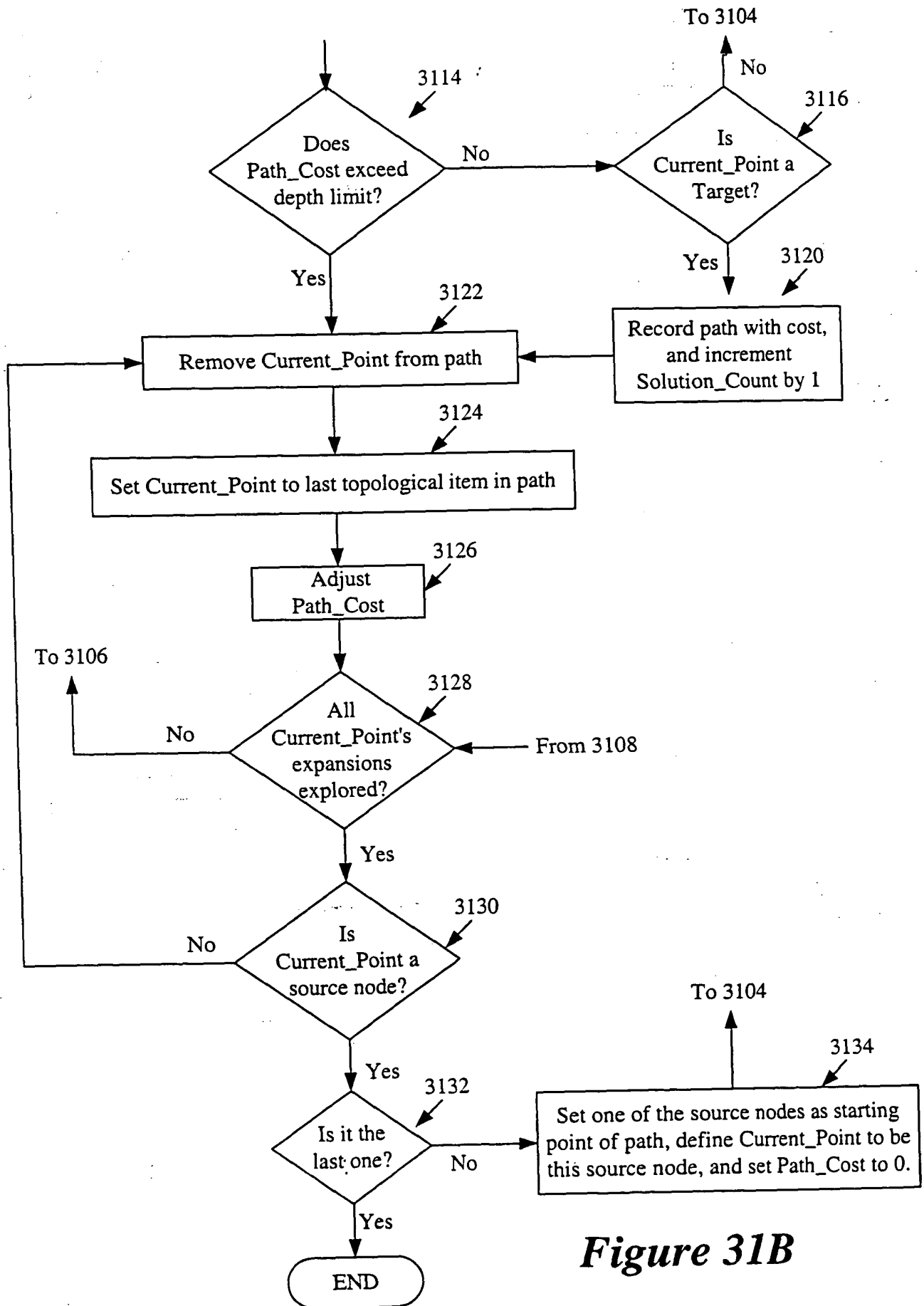


Figure 31B

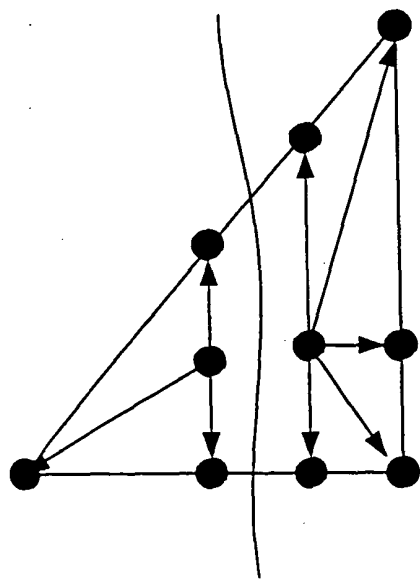


Figure 35

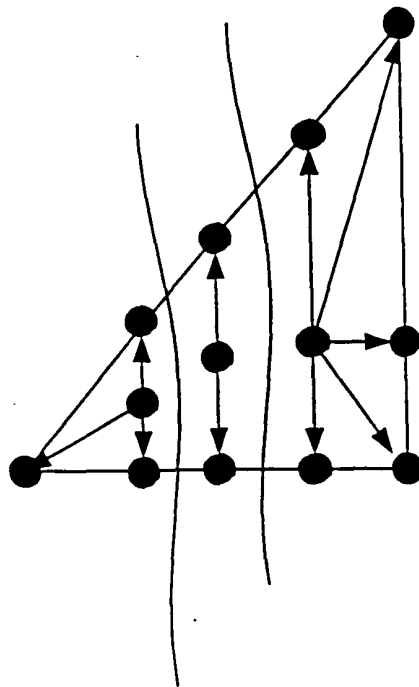


Figure 36

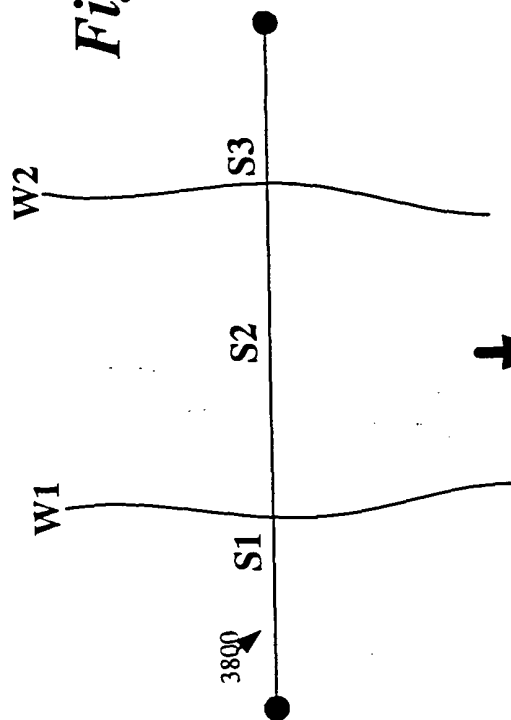


Figure 38A

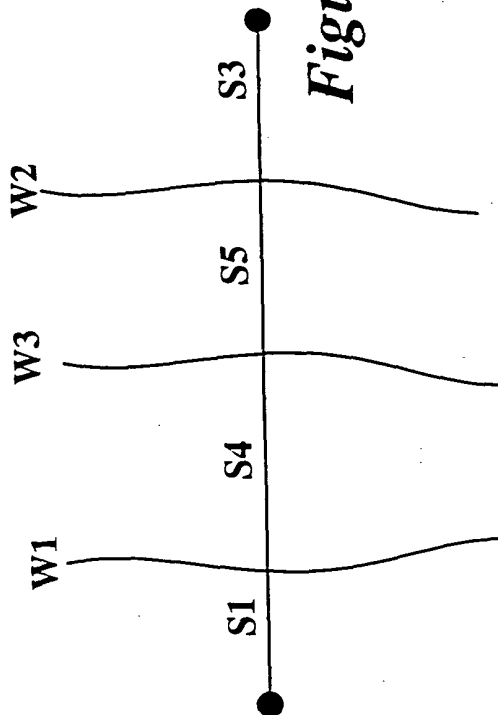


Figure 38B

To:		Node	Face Item	Edge Item
From:	Node	<ul style="list-style-type: none"> • Planarity • Vias 	<ul style="list-style-type: none"> • Vias 	<ul style="list-style-type: none"> • Planarity • Vias • Edge • Capacity
		<ul style="list-style-type: none"> • Vias 	<ul style="list-style-type: none"> • Vias 	<ul style="list-style-type: none"> • Vias • Edge • Capacity
		<ul style="list-style-type: none"> • Planarity • Vias 	<ul style="list-style-type: none"> • Vias 	<ul style="list-style-type: none"> • Planarity • Vias • Edge • Capacity

Figure 37

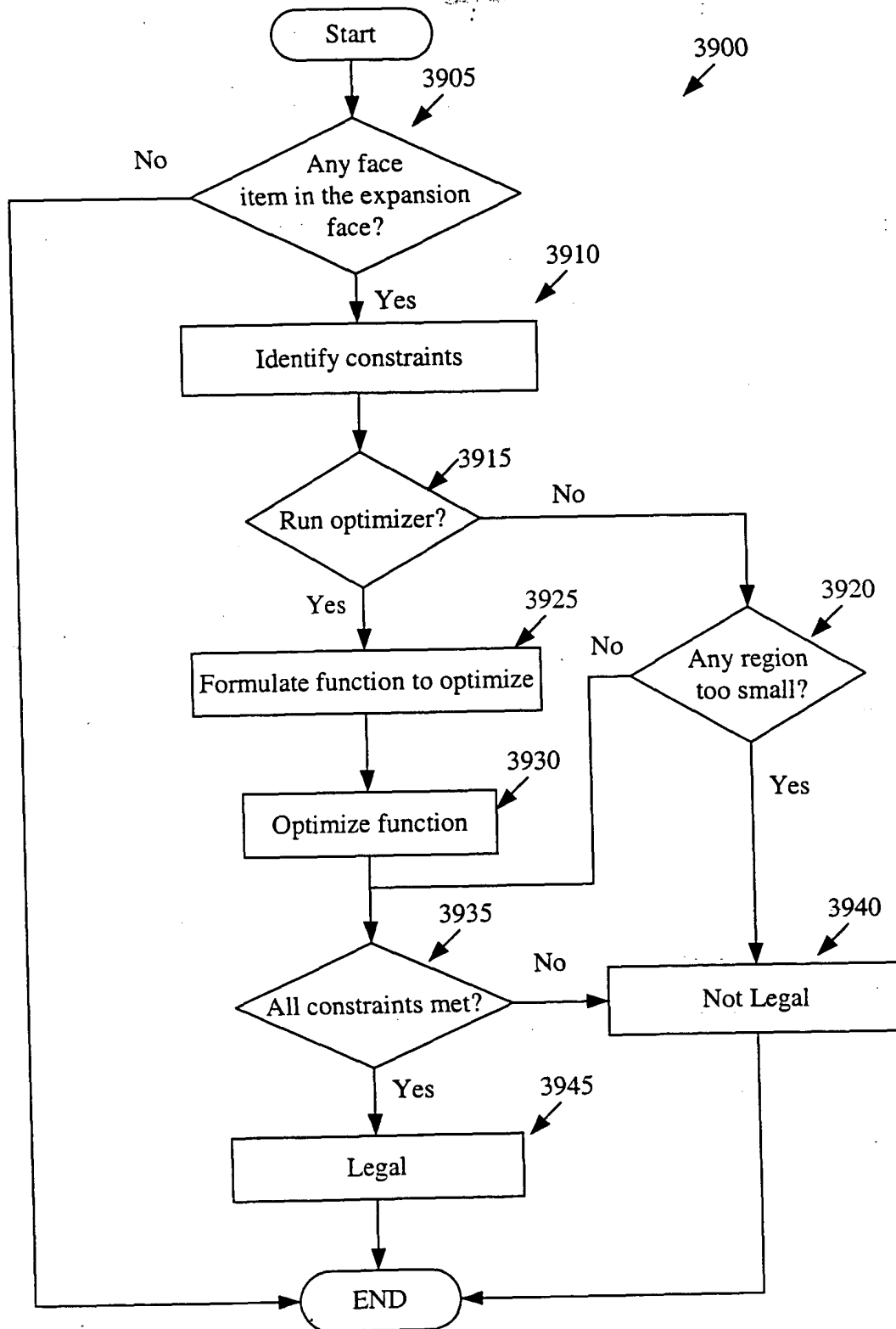


Figure 39A

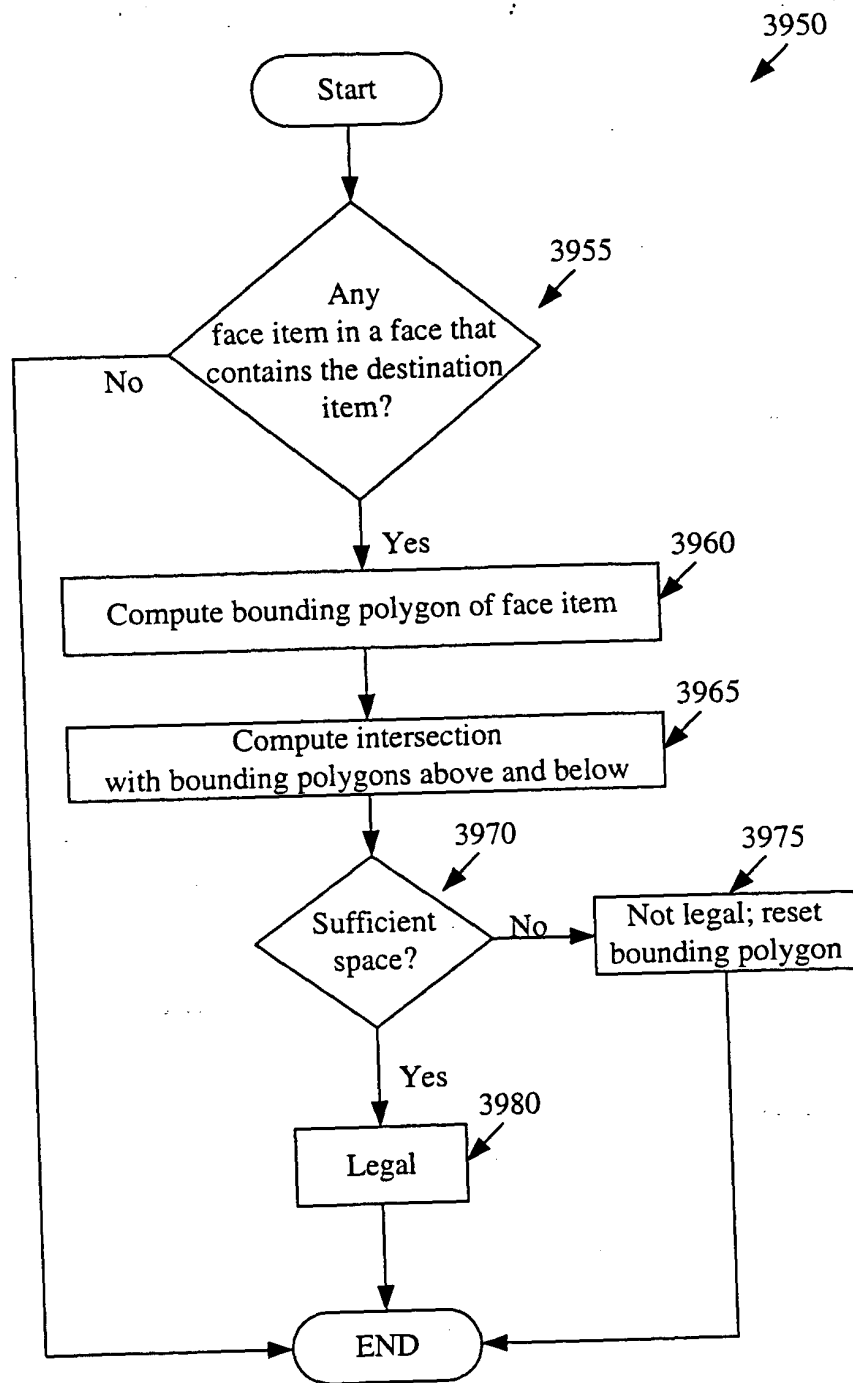


Figure 39B

20250404 45039001

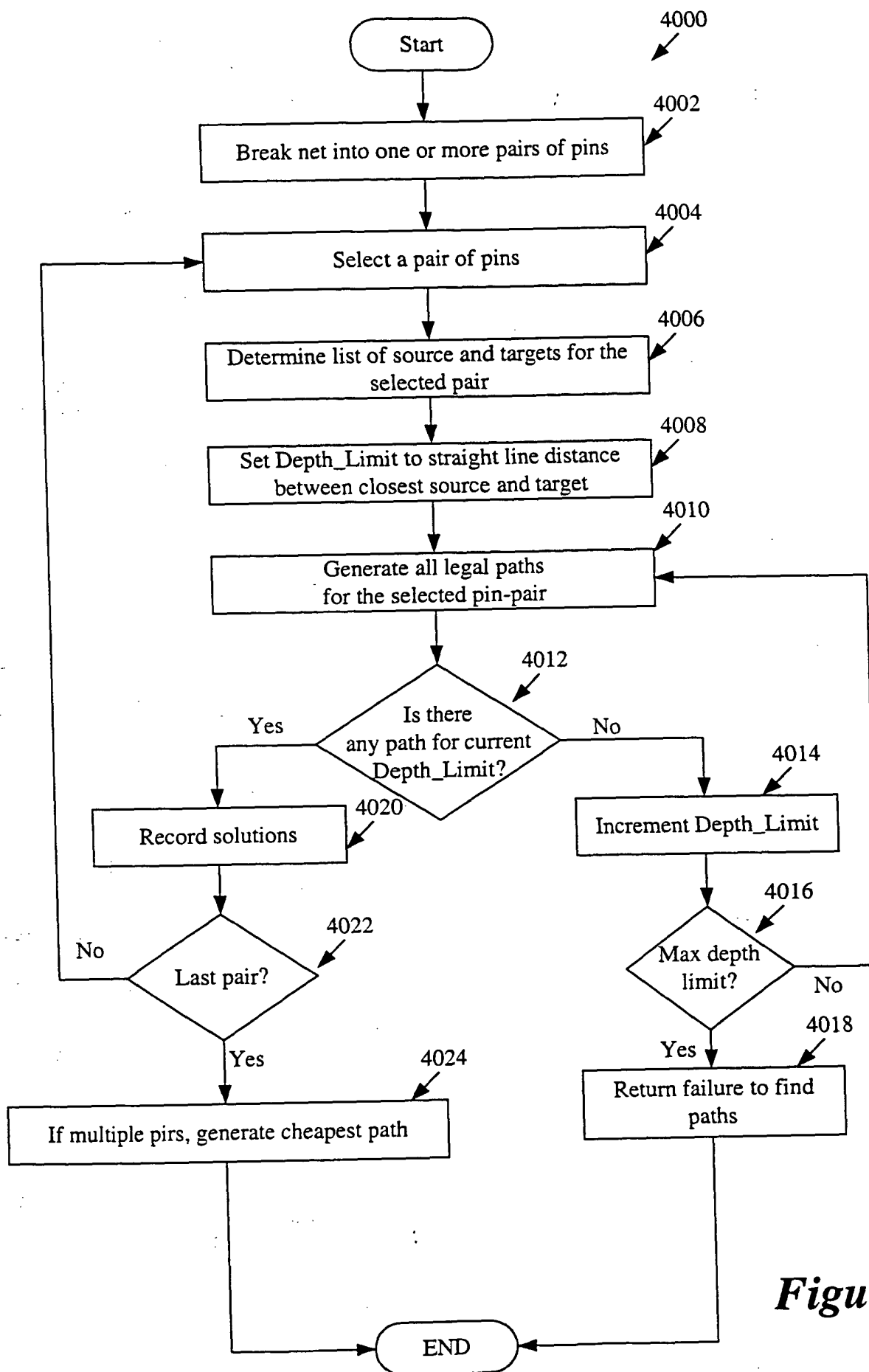


Figure 40

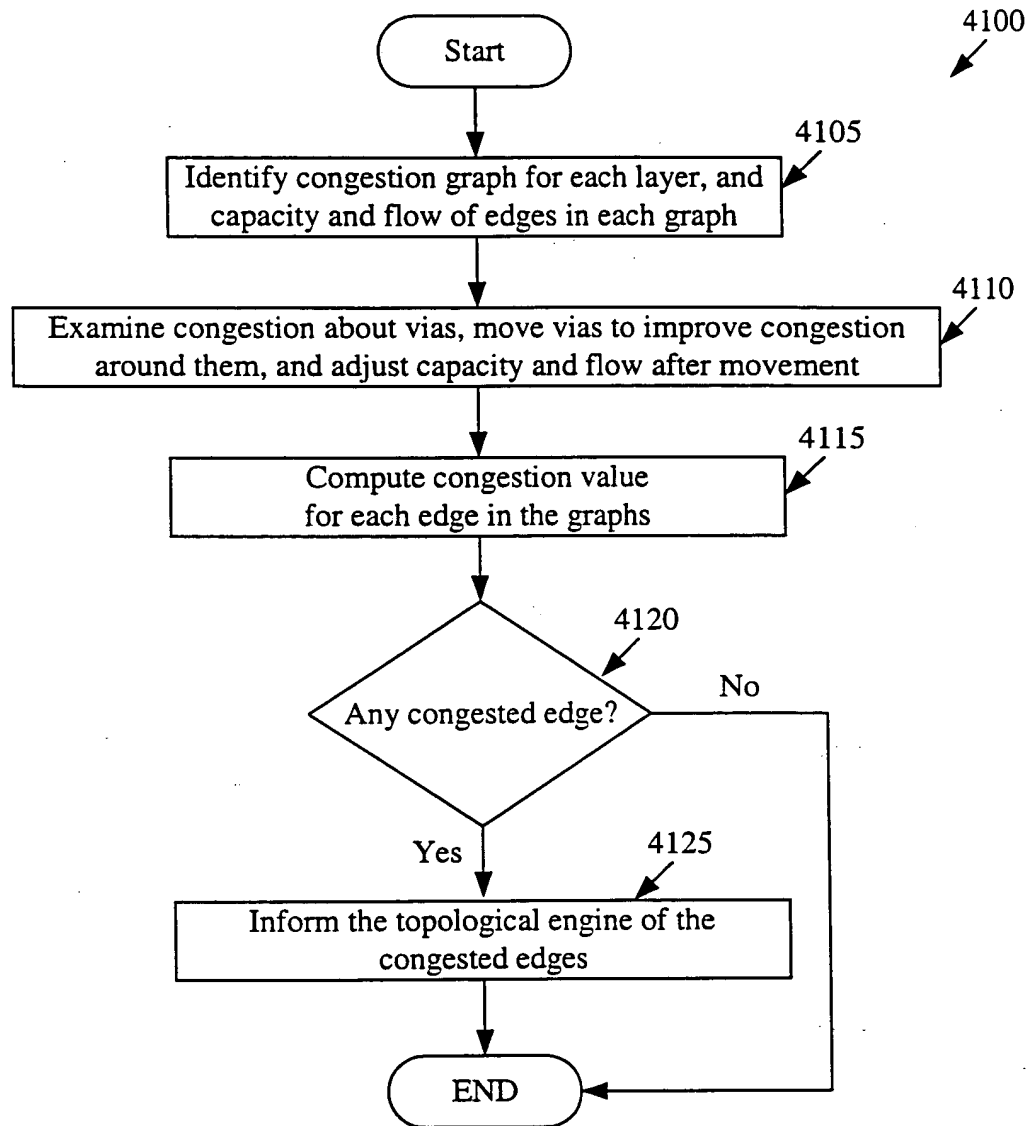


Figure 41

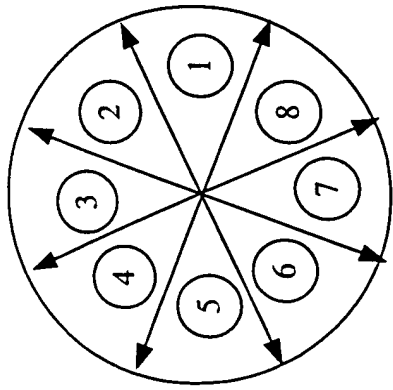


Figure 42

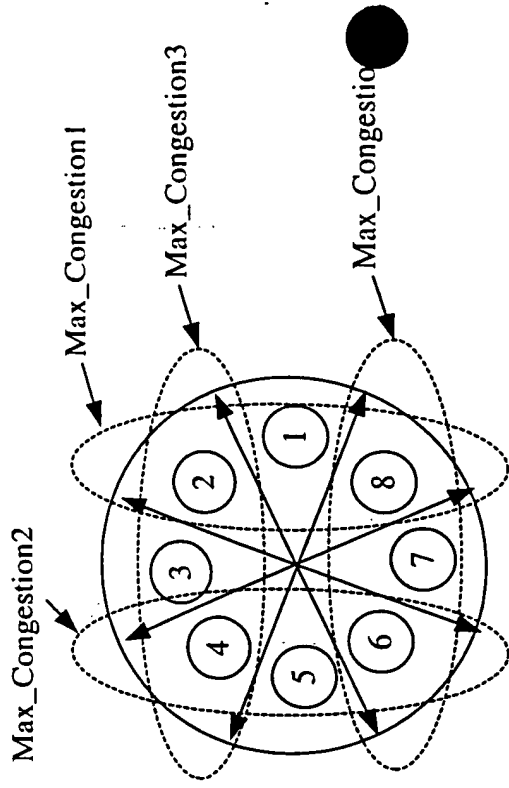


Figure 44

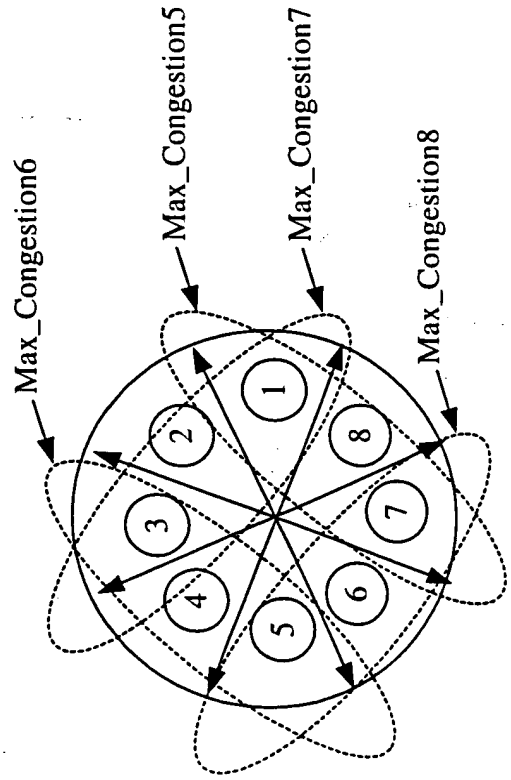


Figure 45

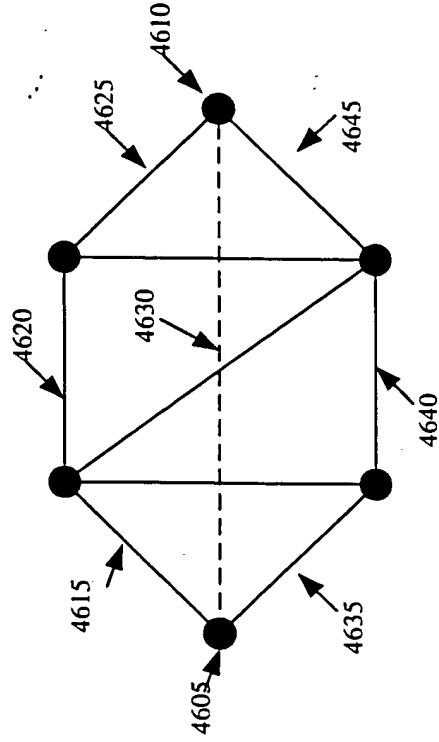


Figure 46

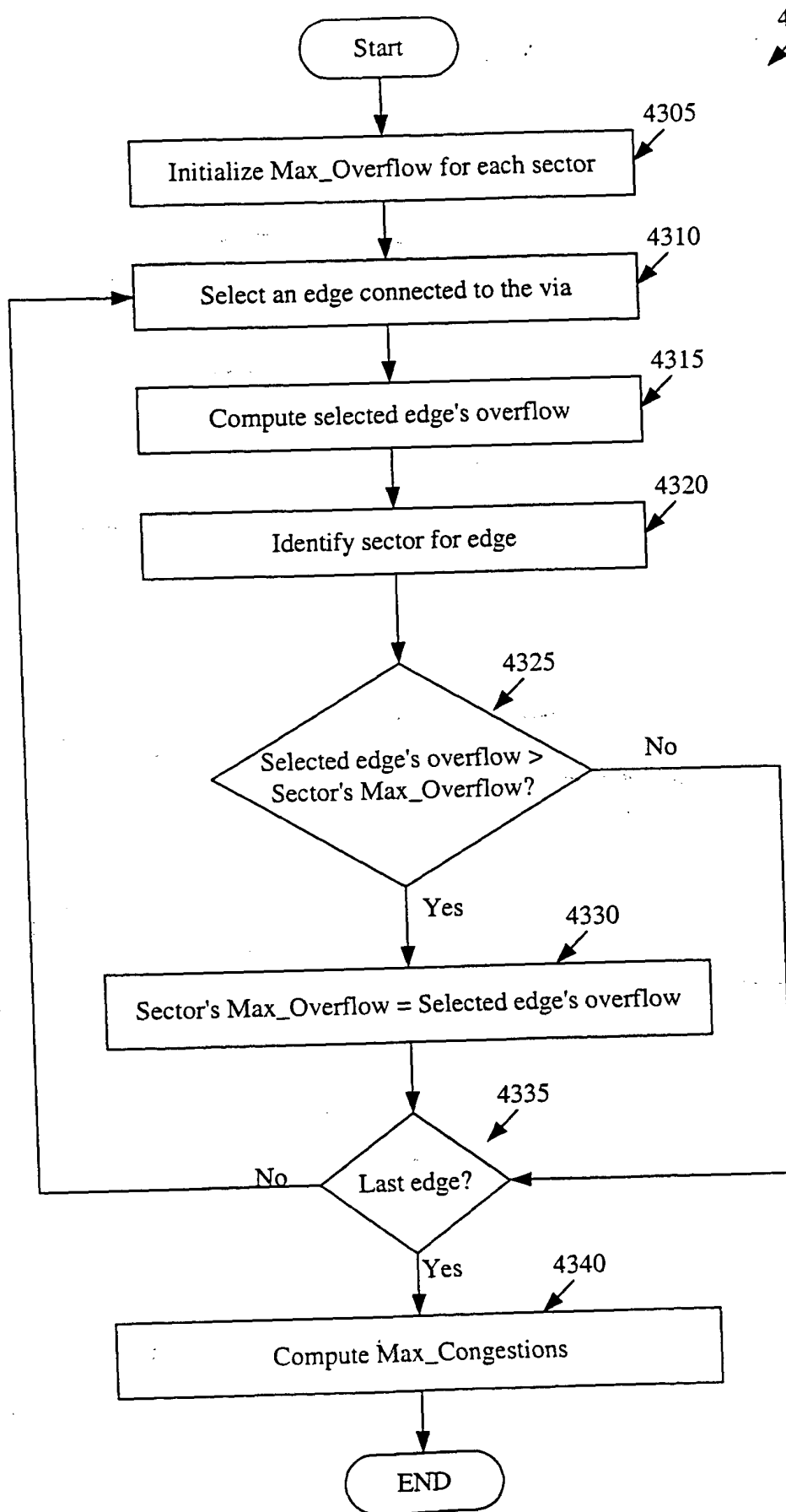


Figure 43

207E0"4609900T

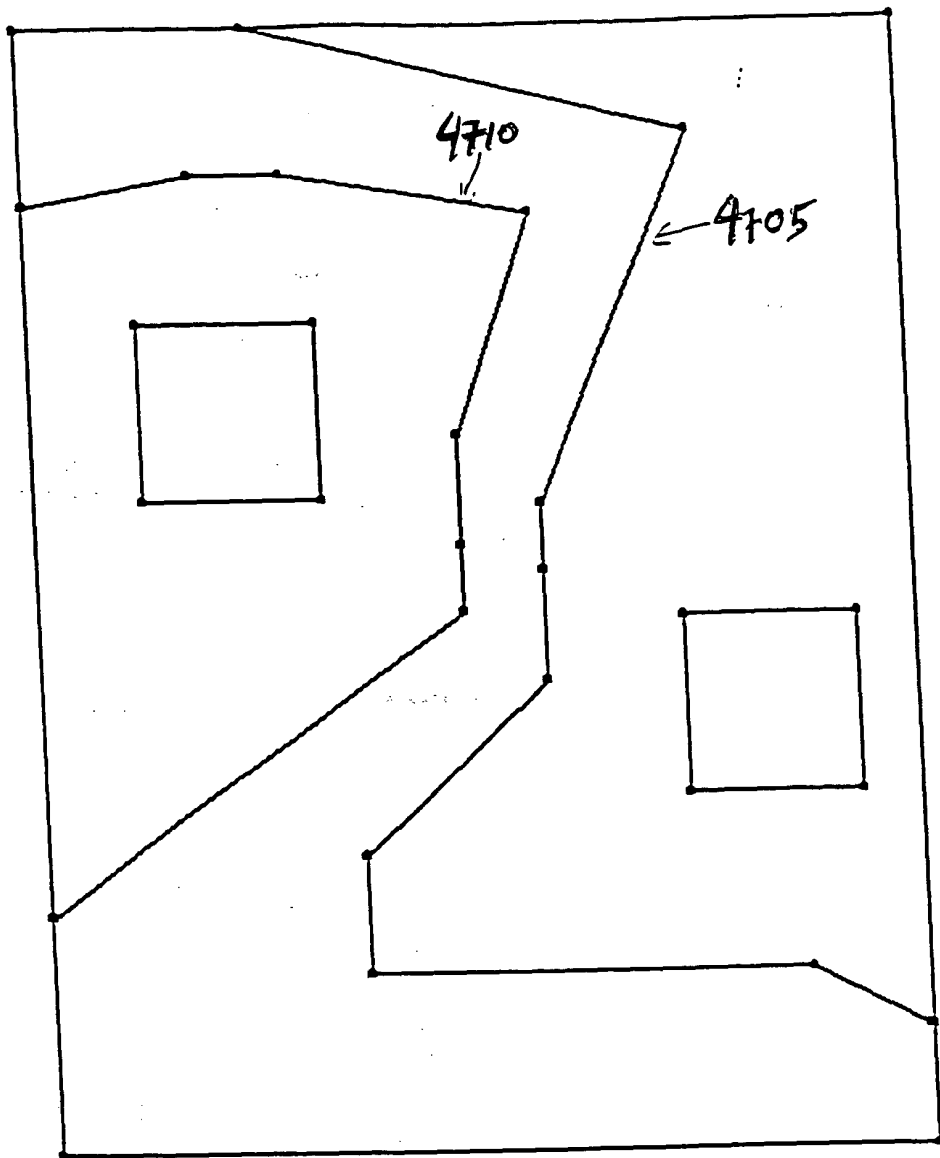


FIGURE 47

201610146099001

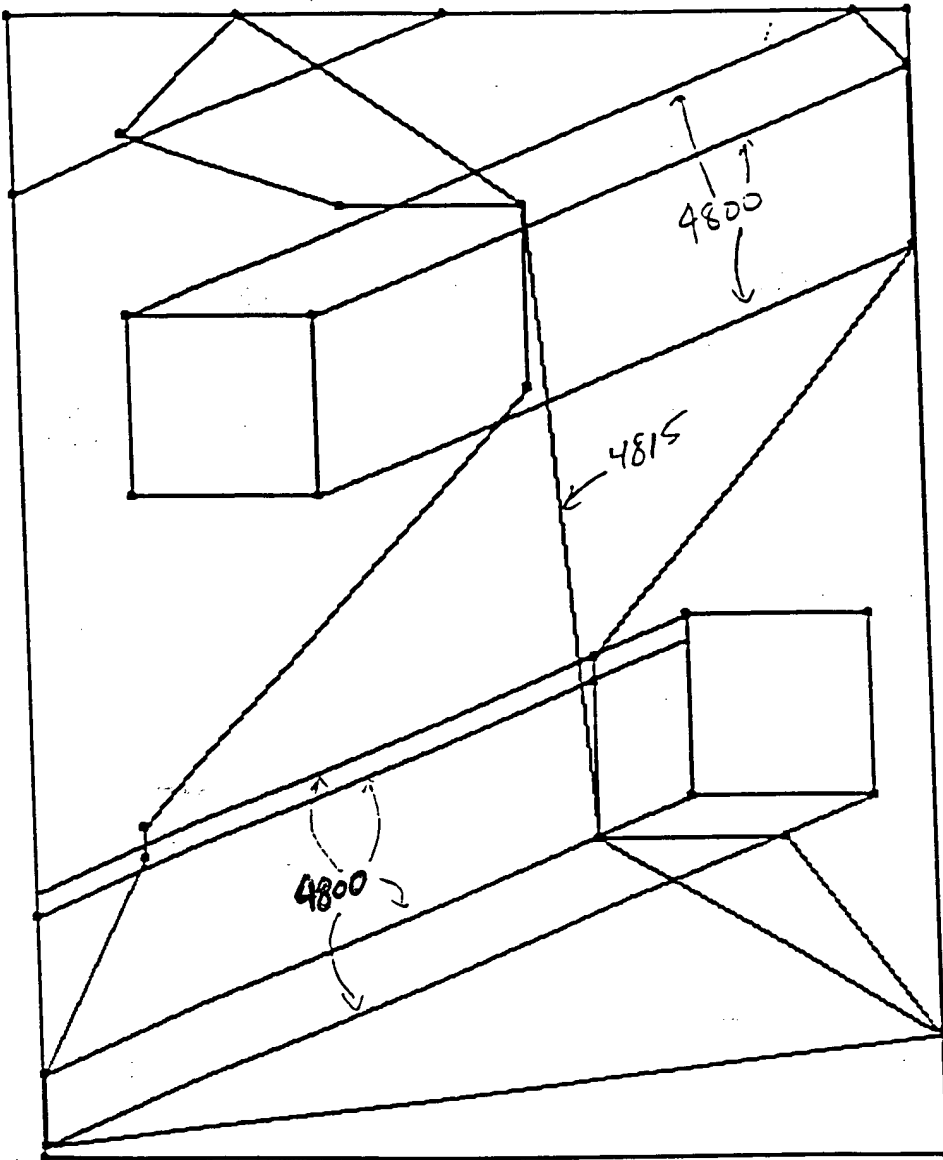


FIGURE 48A

20150710 10:00:00

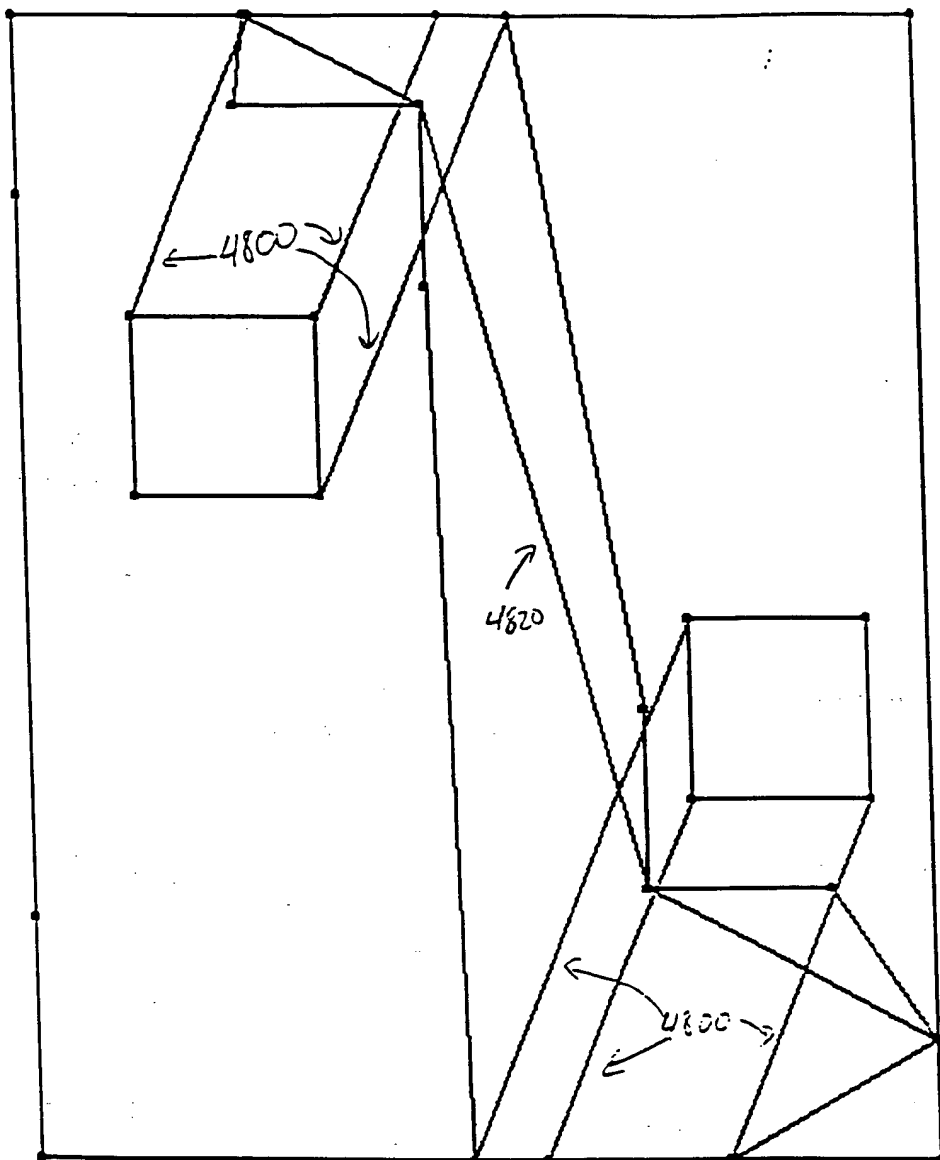


FIGURE 48B

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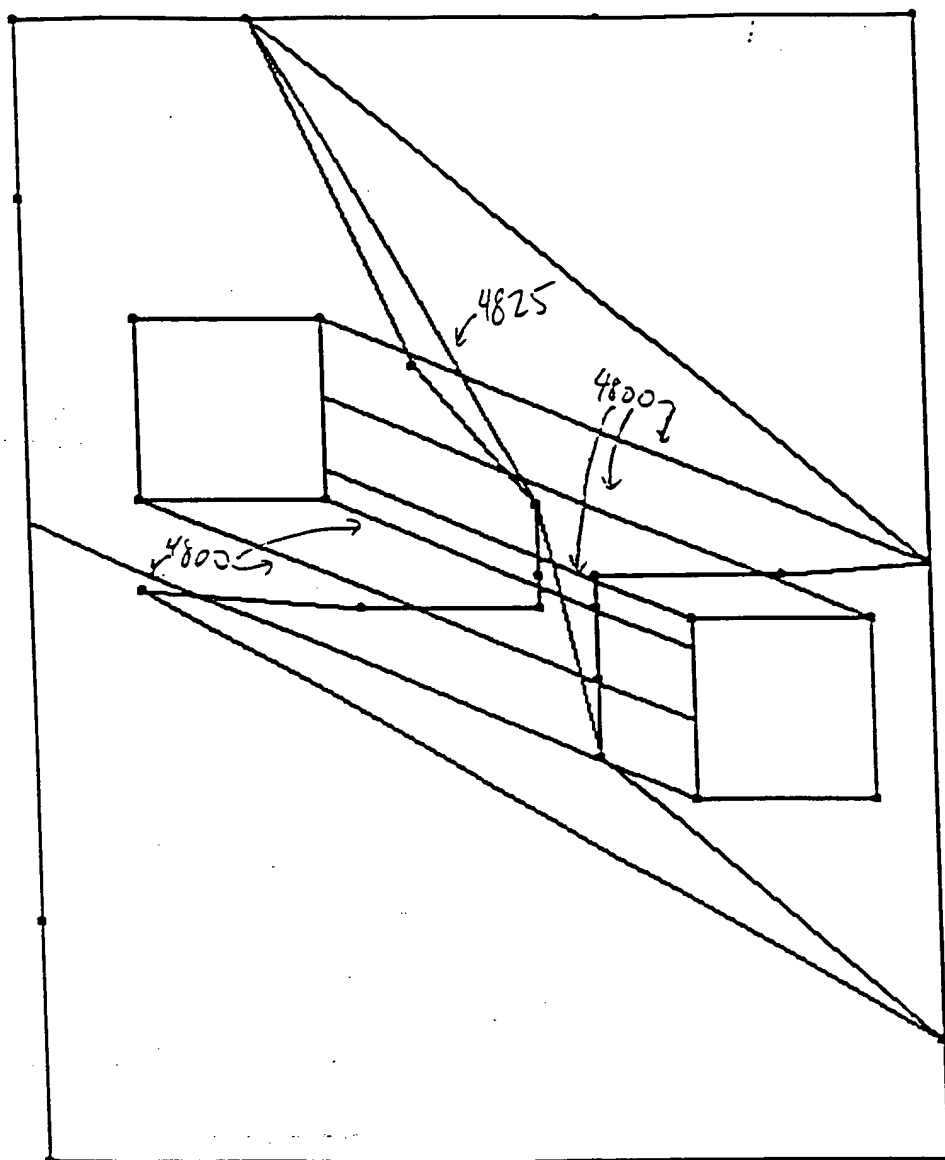


FIGURE 48C

20150704 16:00:00

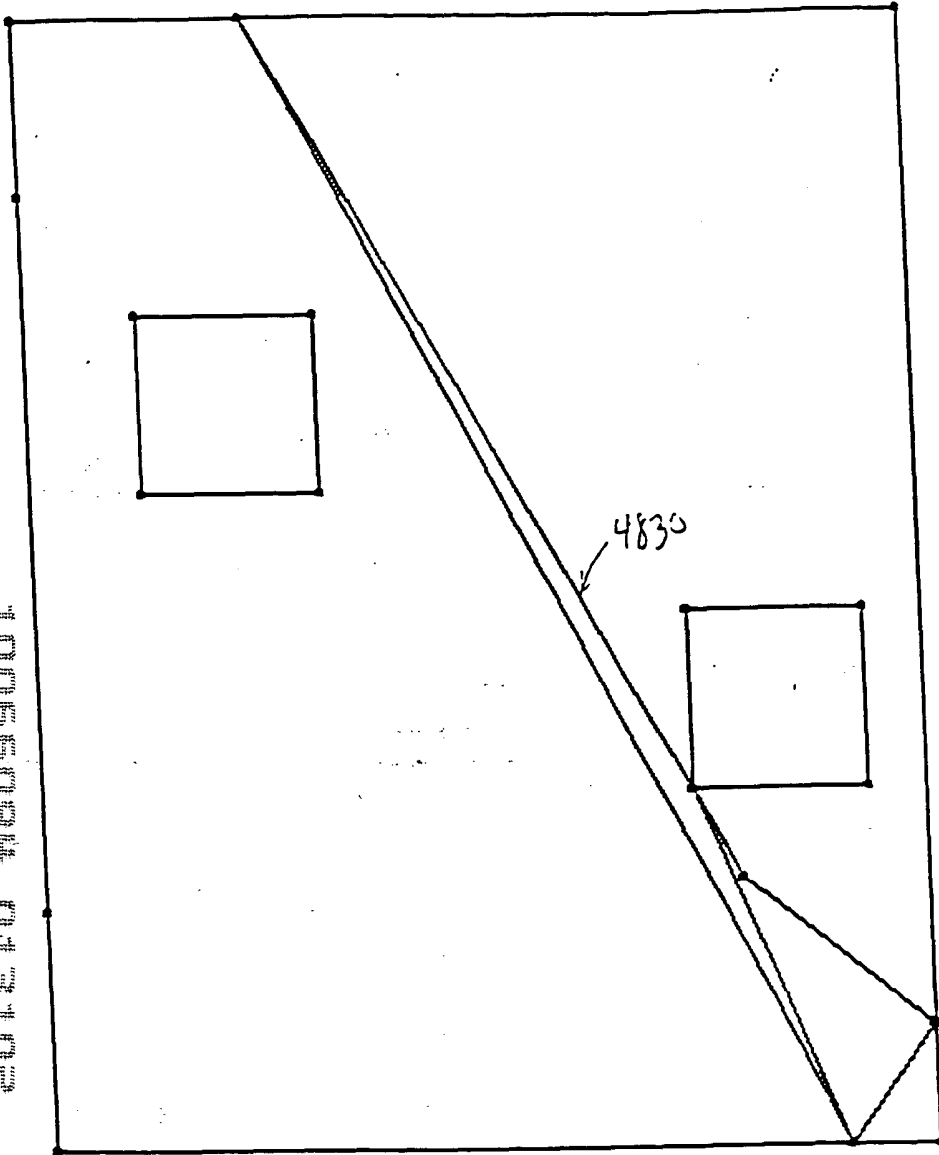


FIGURE 48D

2015-10-16 09:00:01

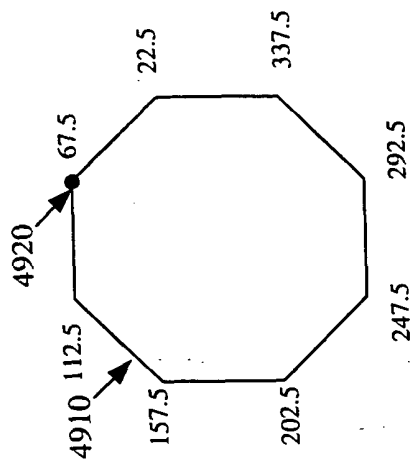


Figure 49A

Figure 49B

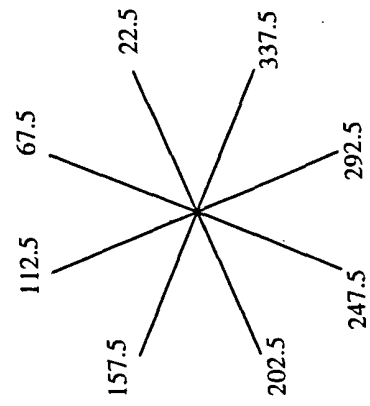


Figure 49C

201E0"46022001

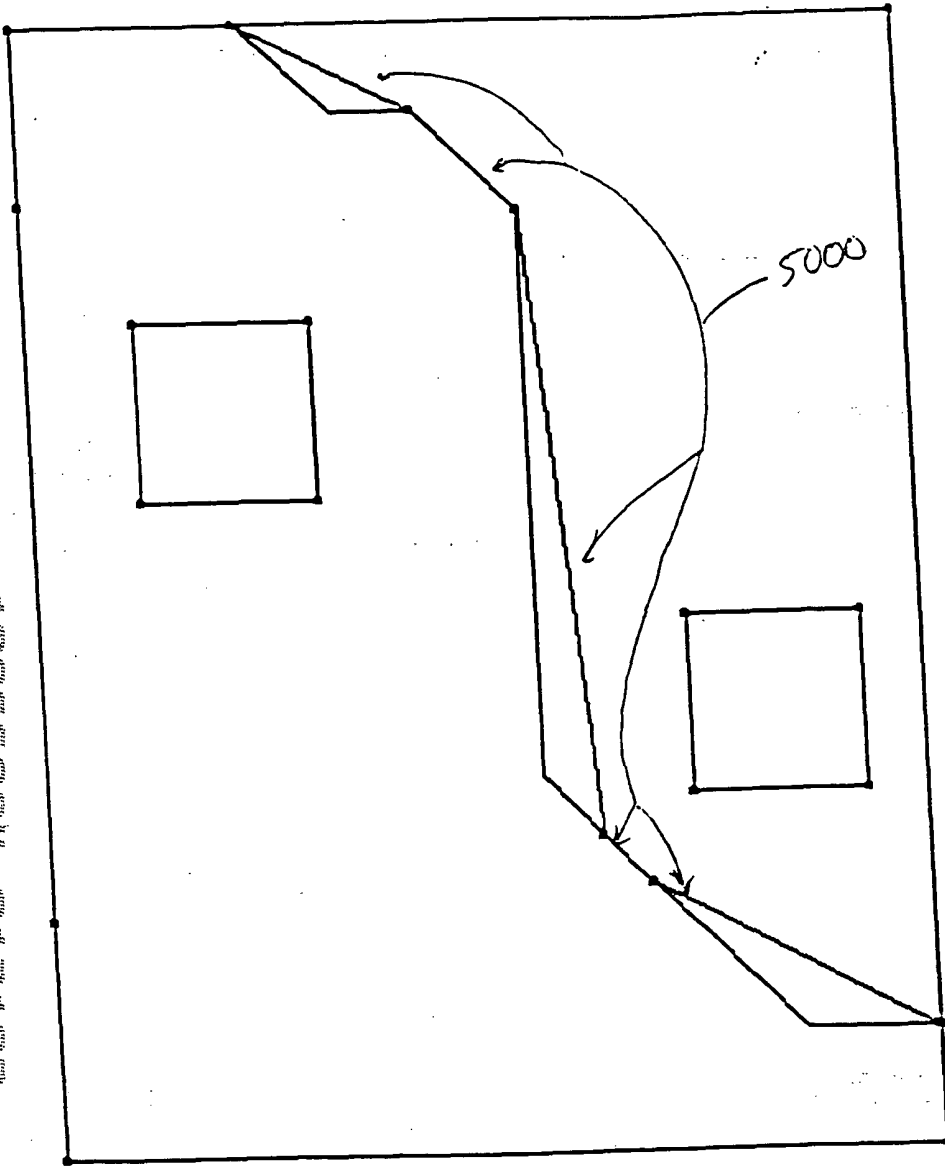


FIGURE 50

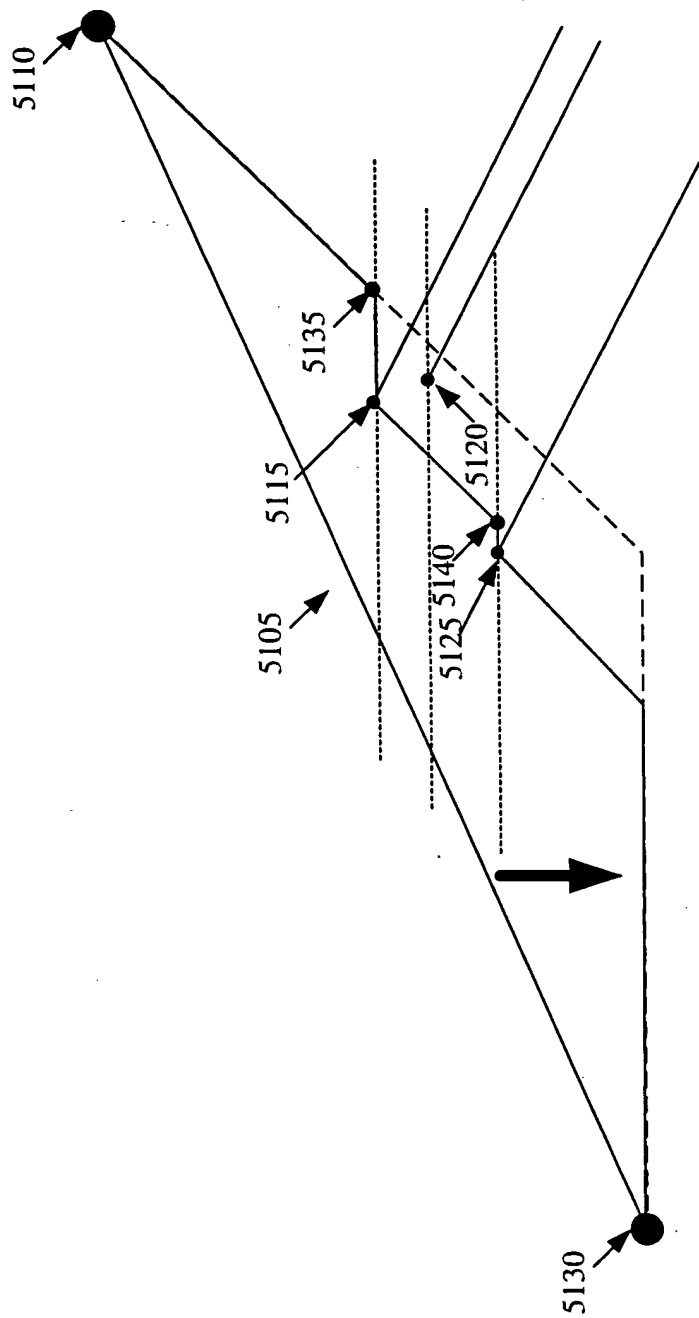


Figure 51

10066094.043102

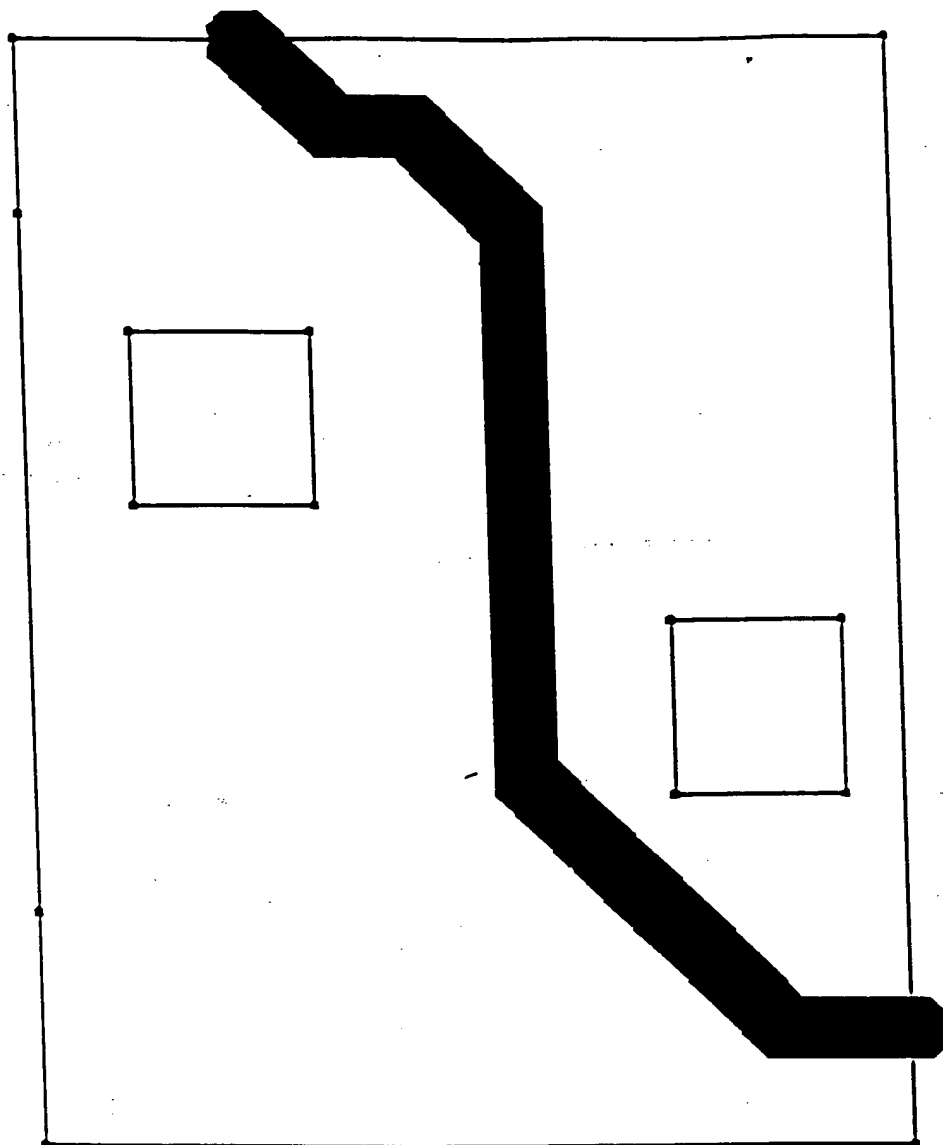


FIGURE 52

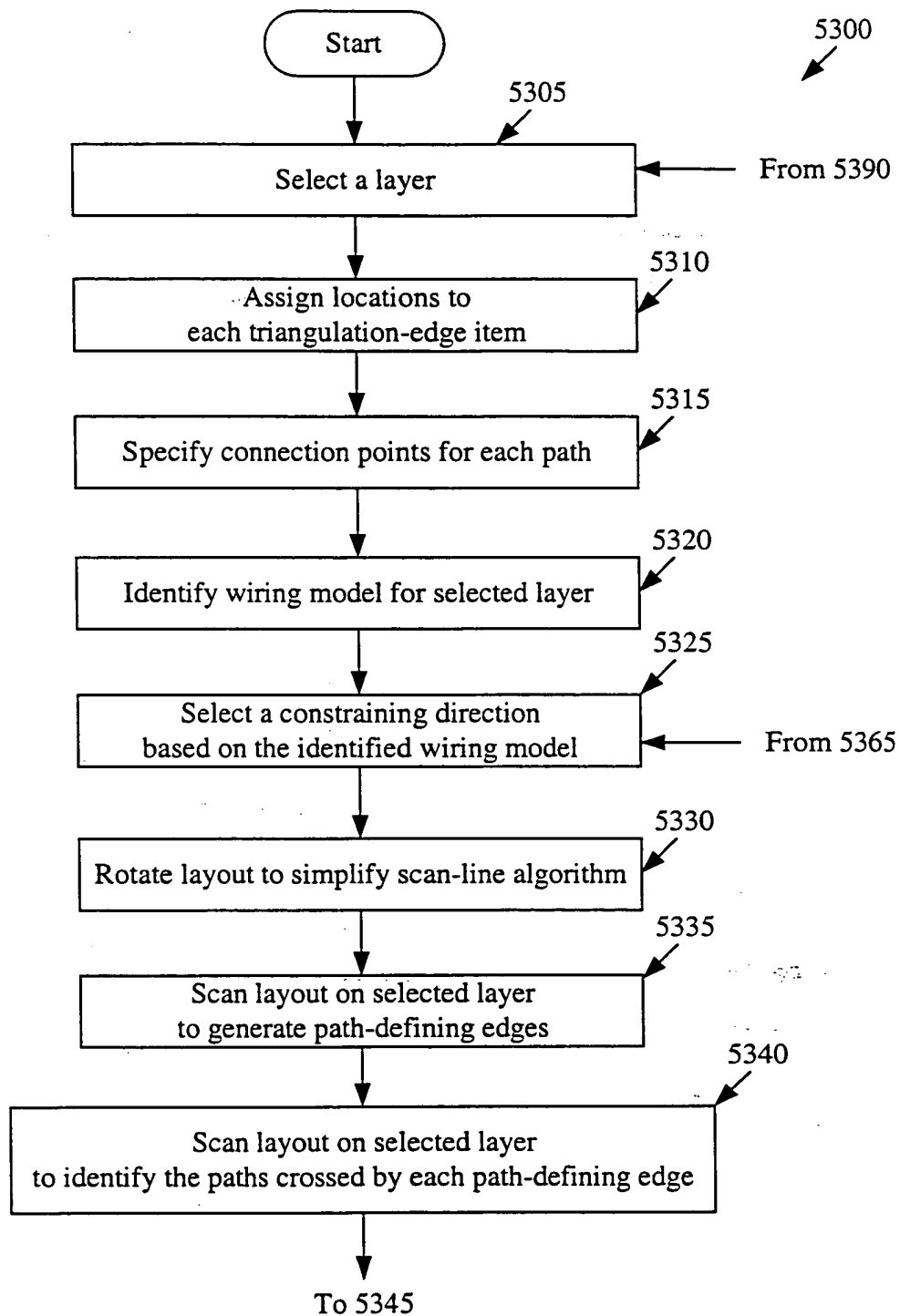


Figure 53

Figure 53: Figure 53A
Figure 53B

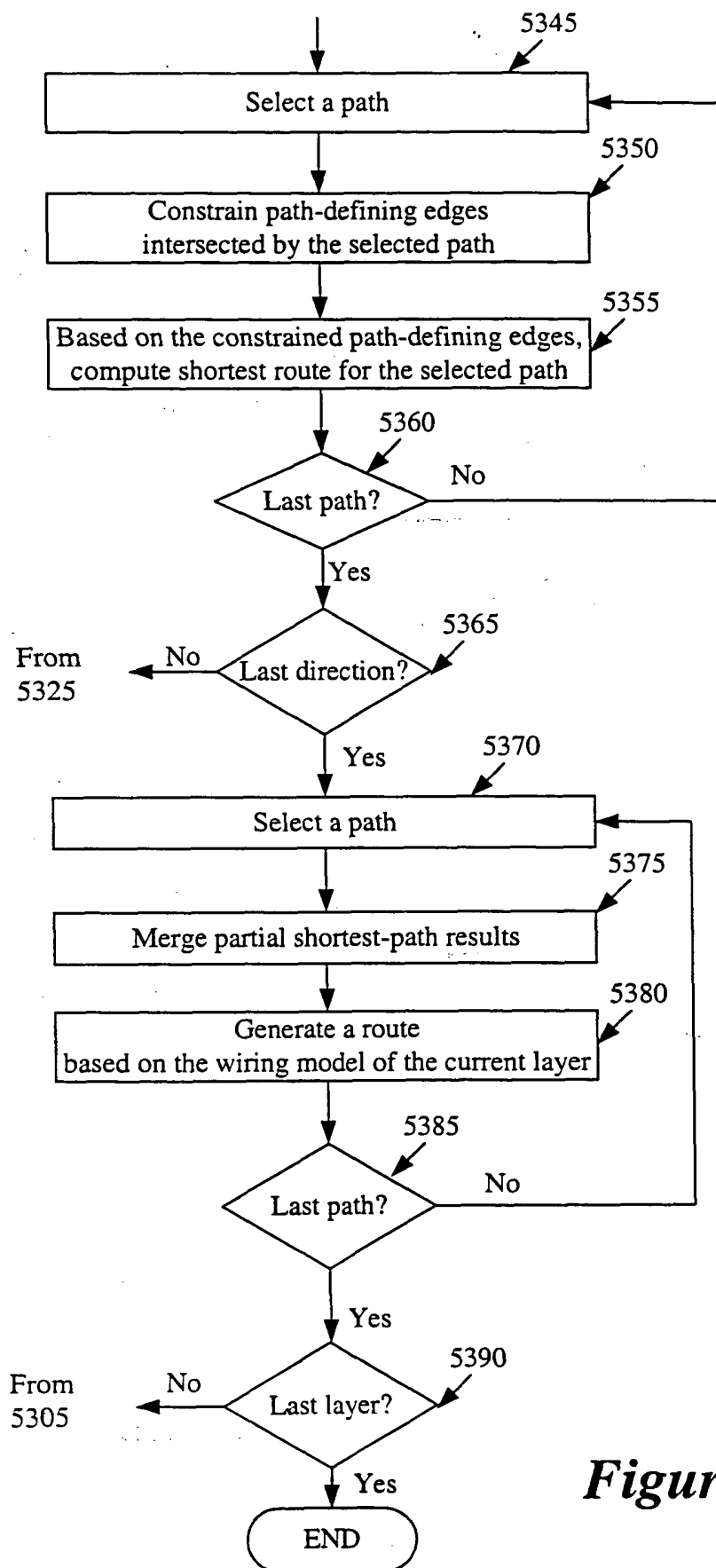
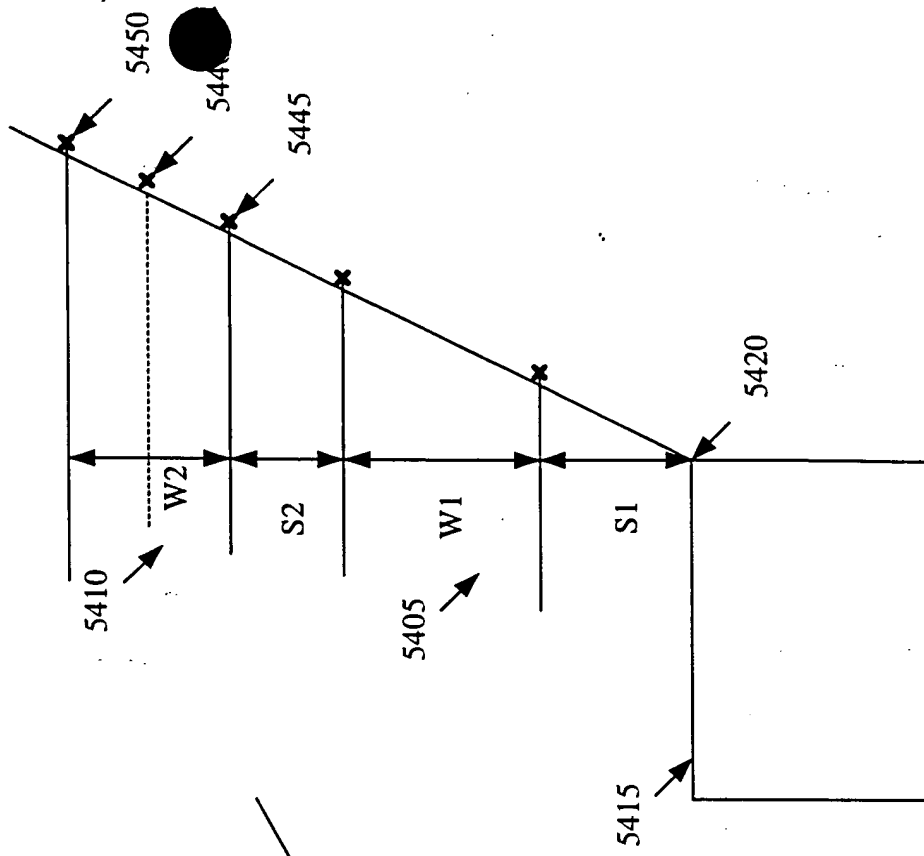
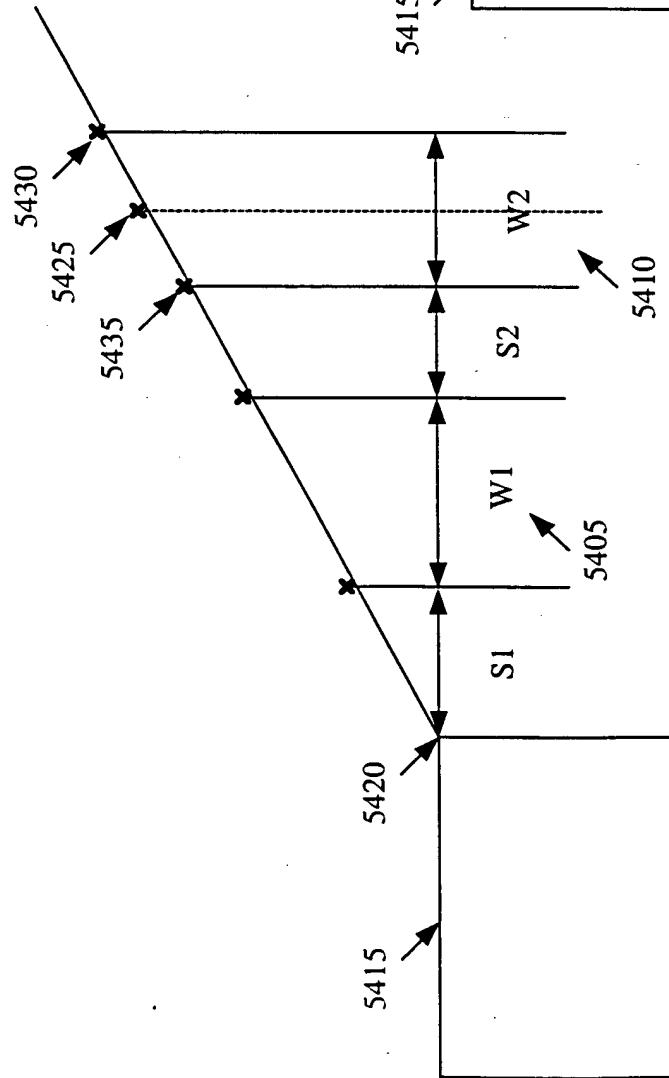


Figure 53B

THE UNIVERSITY OF CHICAGO



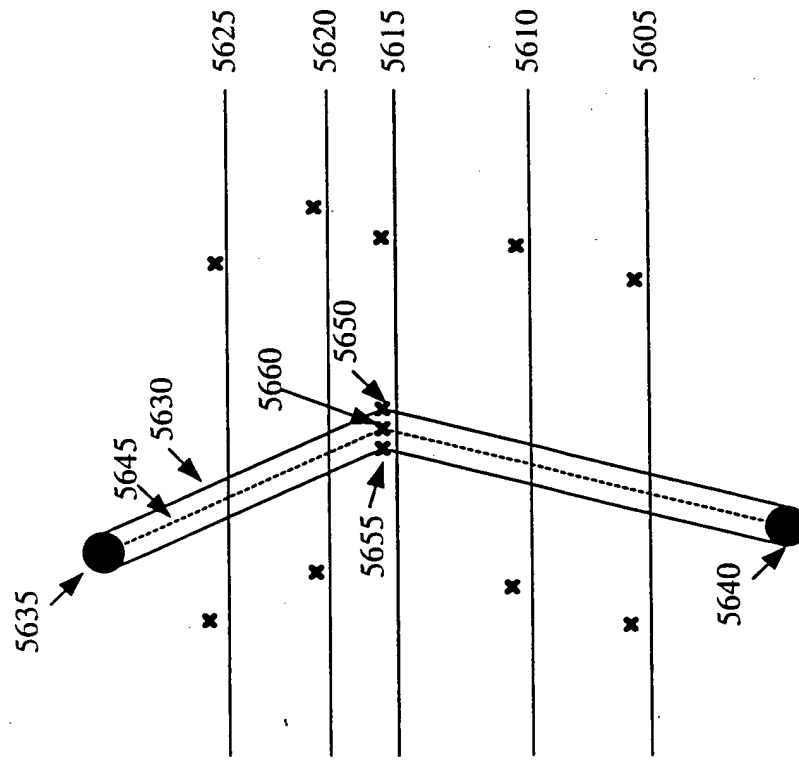


Figure 56

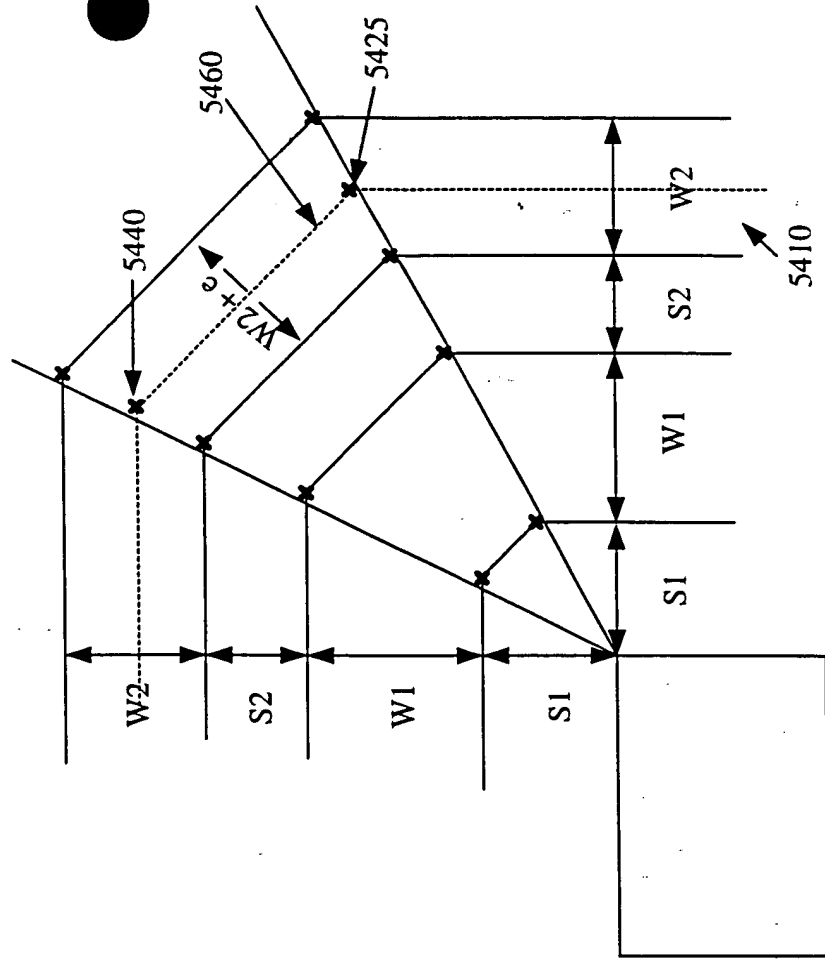


Figure 57

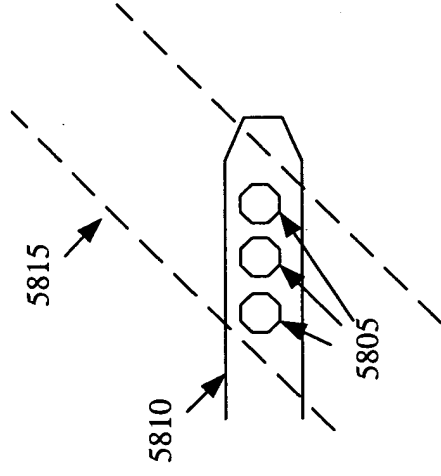


Figure 58

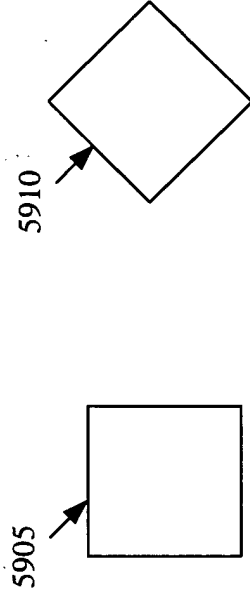


Figure 59

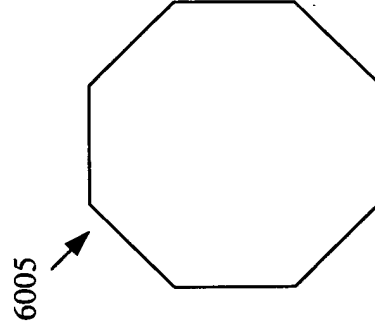


Figure 60

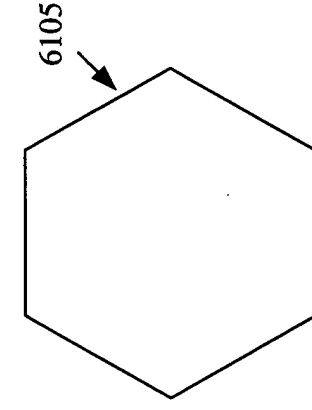


Figure 61

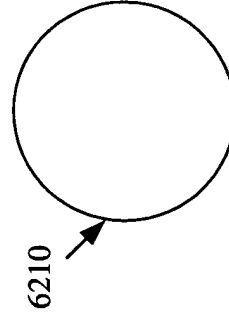


Figure 62

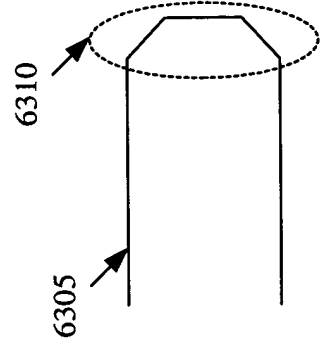


Figure 63

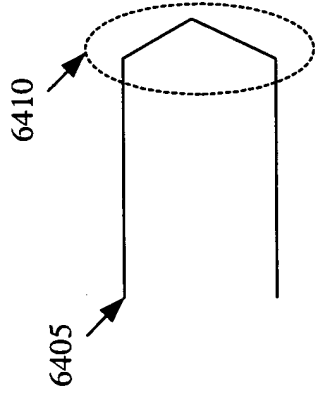


Figure 64

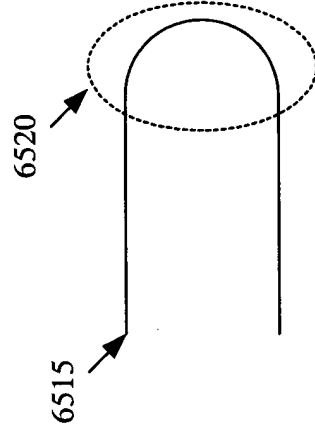
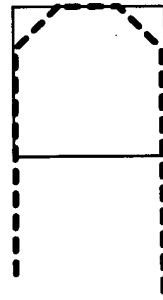
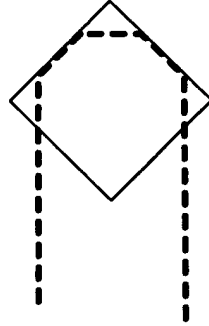


Figure 65

(1)



(2)

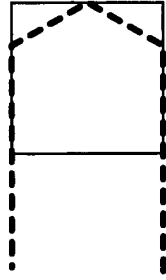


(3)



Figure 66

(1)



(2)

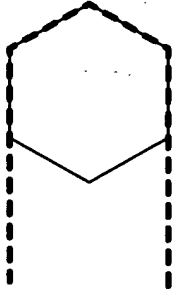


Figure 67

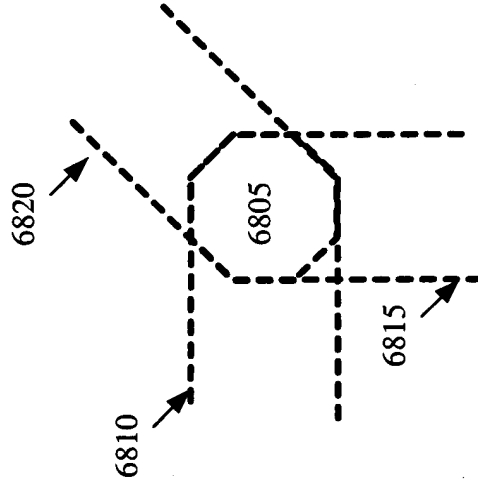


Figure 68

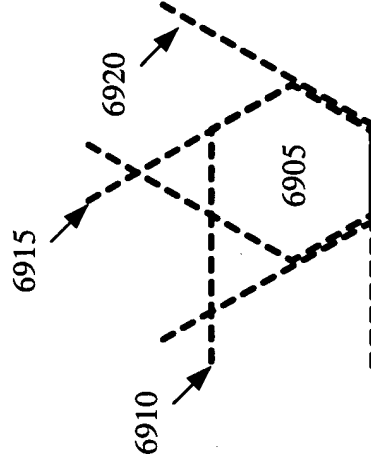
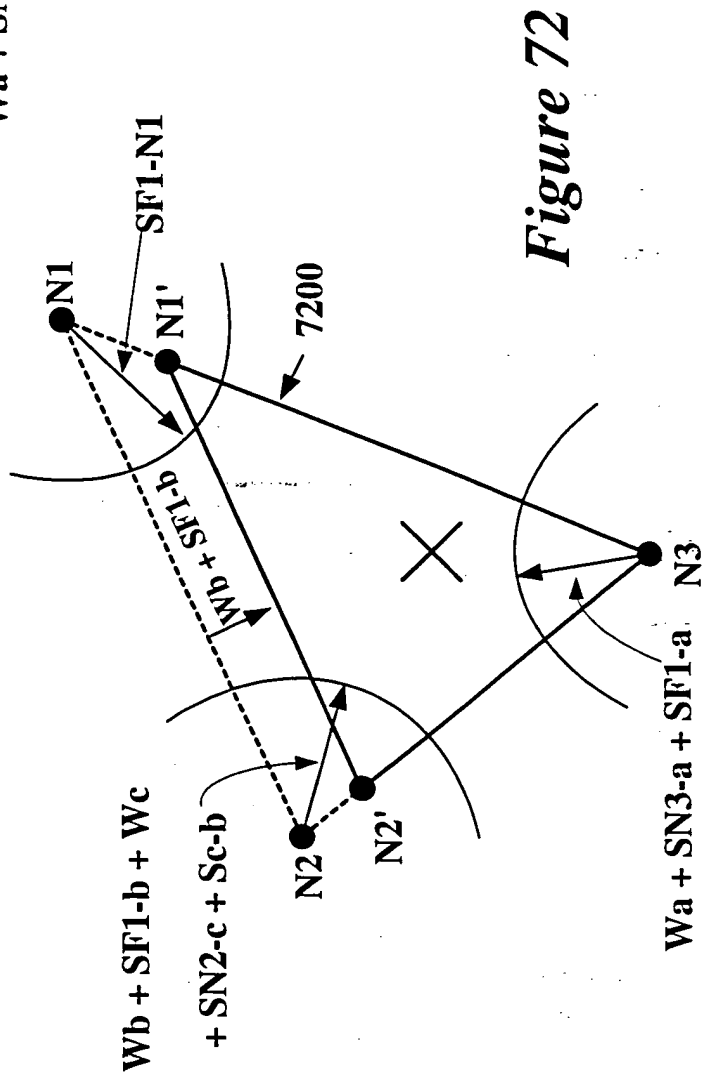
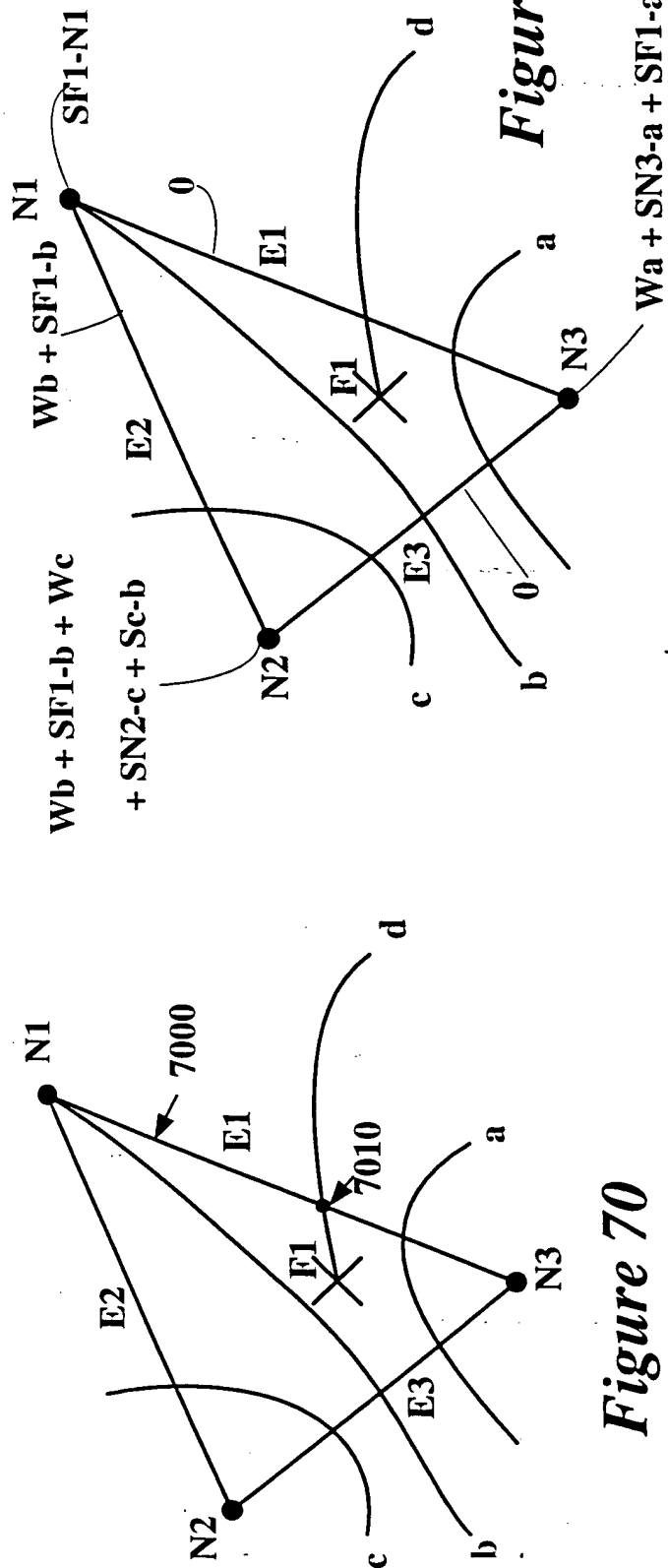


Figure 69



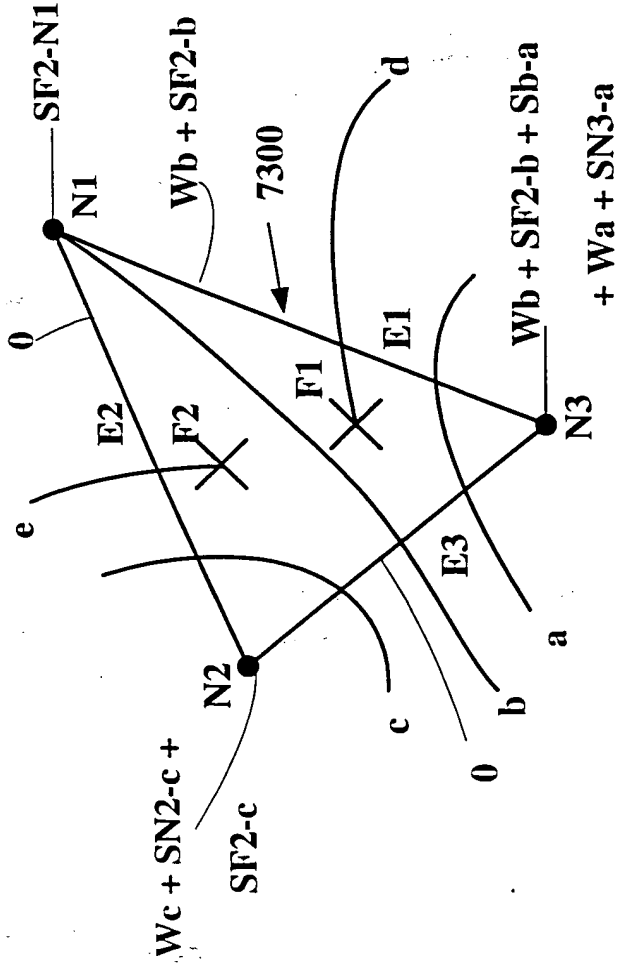


Figure 73

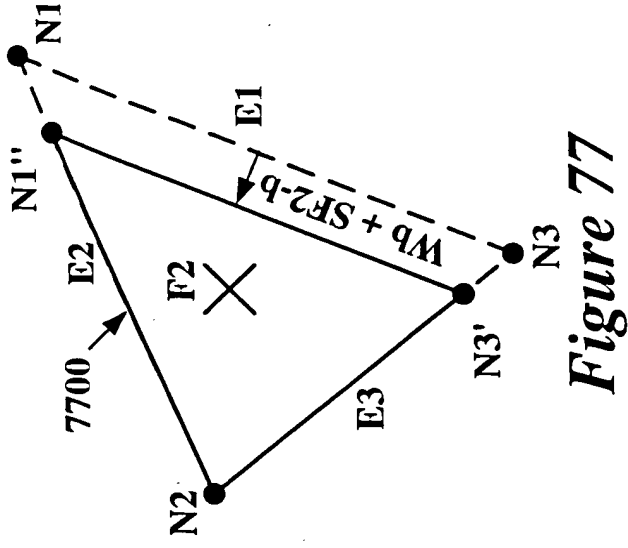


Figure 77

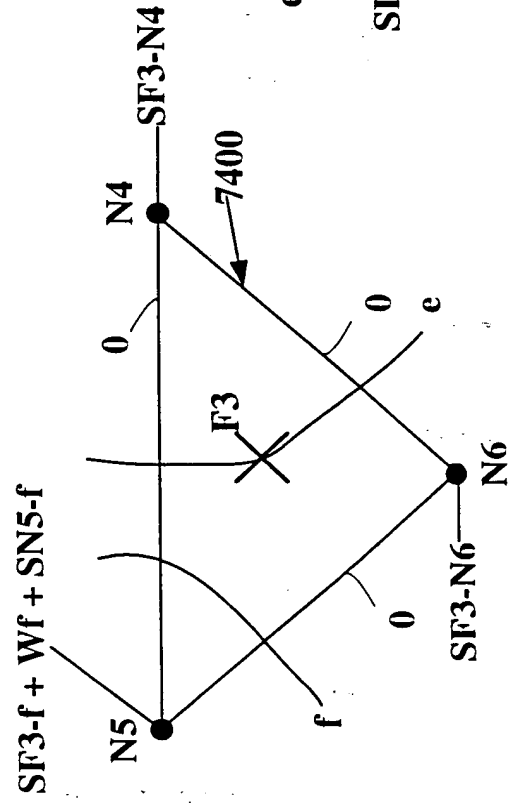


Figure 74

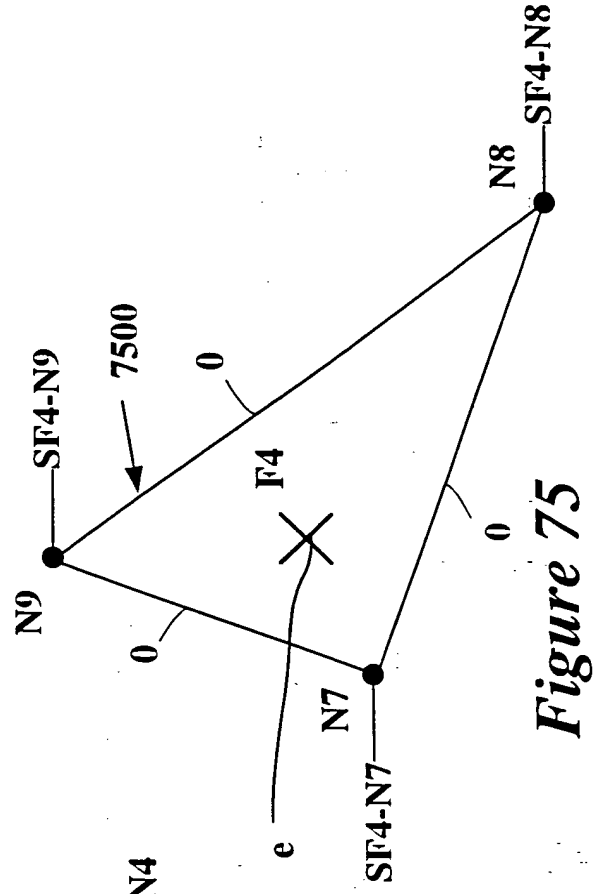


Figure 75

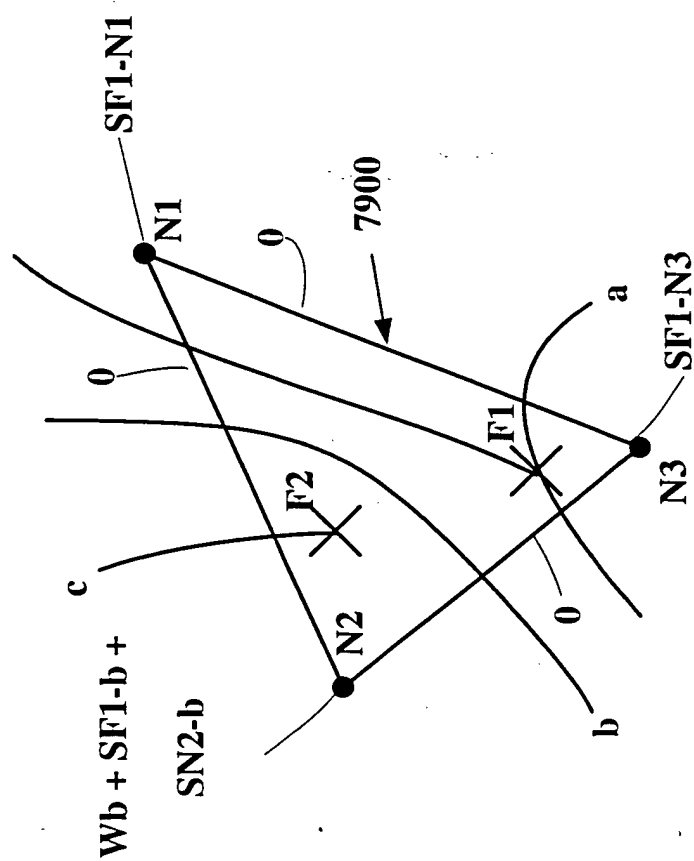


Figure 79

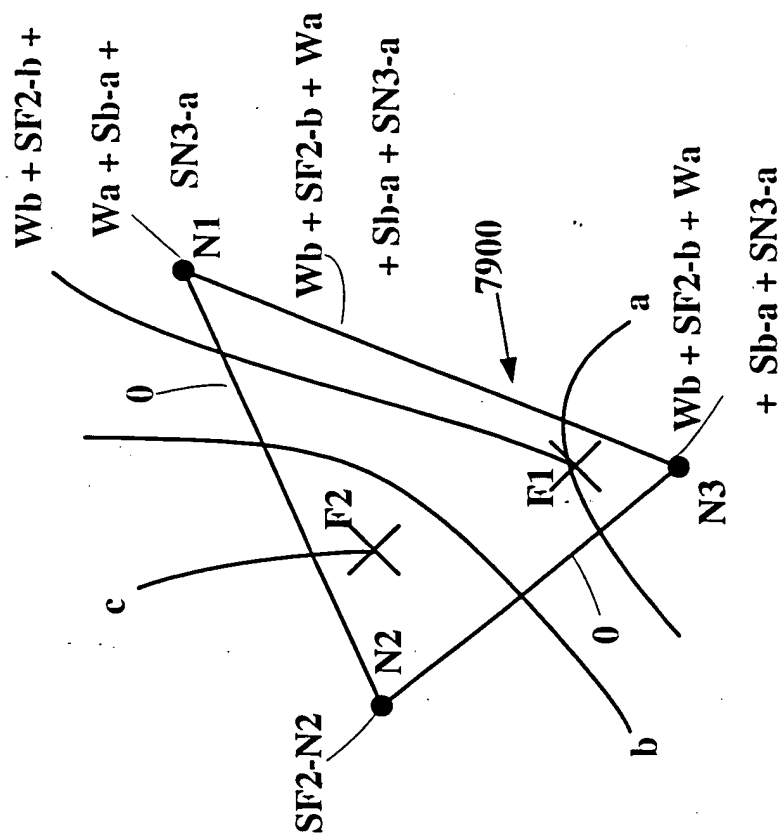


Figure 80

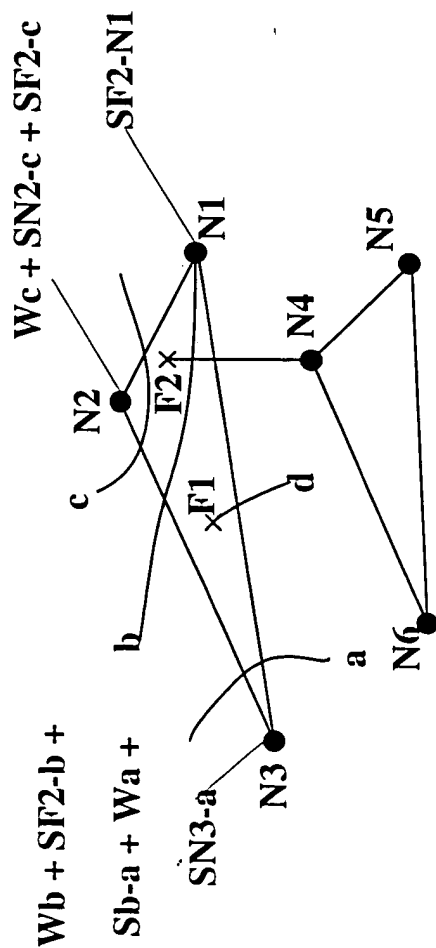


Figure 81

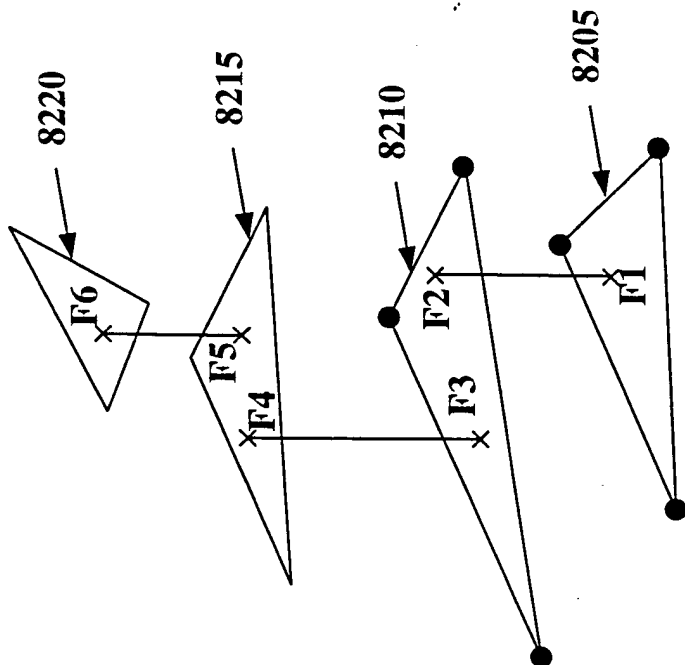


Figure 82

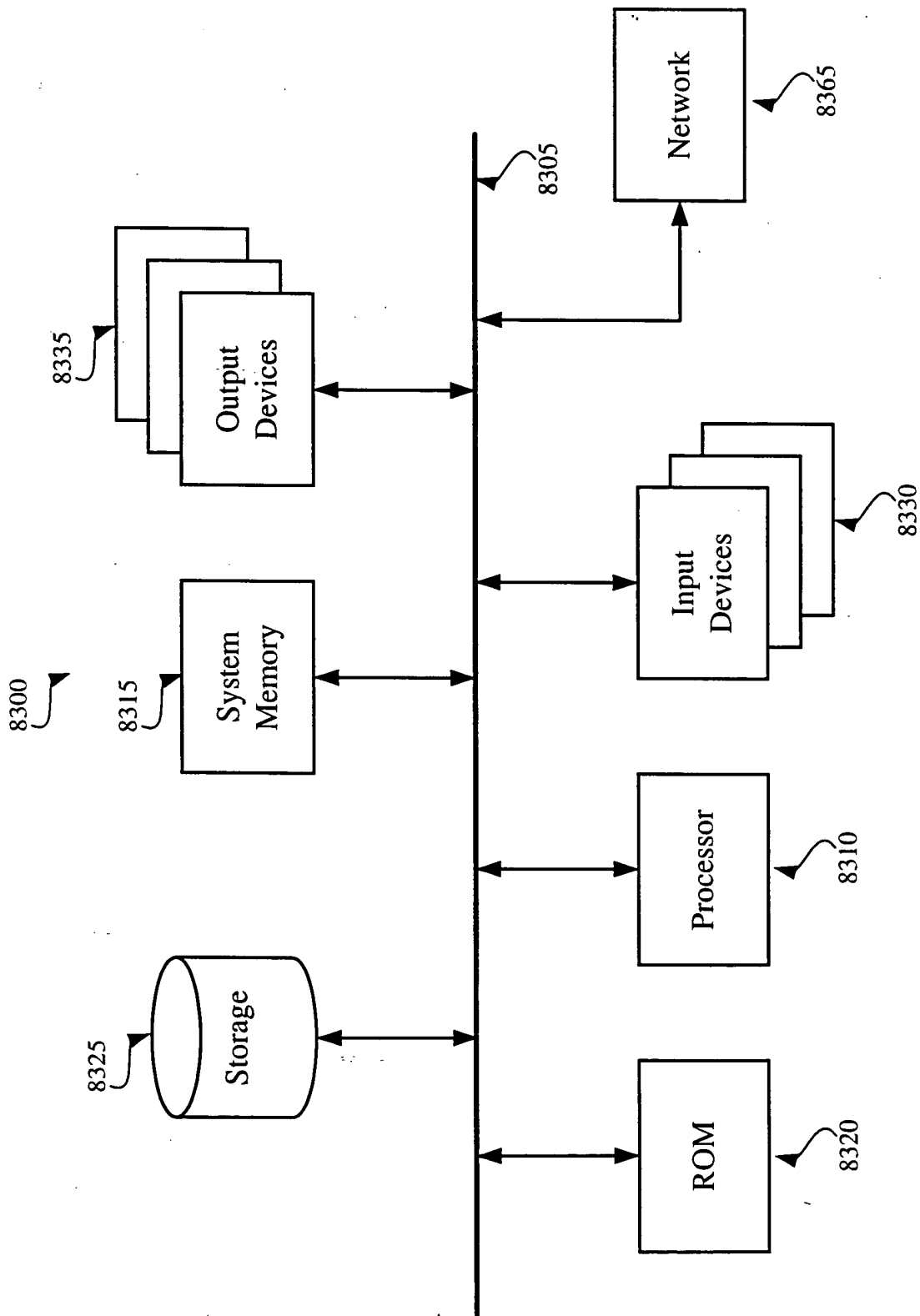


Figure 83